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PATENTS FOR INVENTIONS.

ABRIDGMENTS

OF

Specifications

RELATING TO

VENTILATION.

A.D. 1632–1866.

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PREFACE.

THE Indexes to Patents are now so numerous and costly as to render their purchase inconvenient to a large number of inventors and others, to whom they have become indispensable.

To obviate this difficulty, short abstracts or abridgments of the Specifications of Patents under each head of invention have been prepared for publication separately, and so arranged as to form at once a Chronological, Alphabetical, Subject-matter, and Reference Index to the class to which they relate. As these publications do not supersede the necessity for consulting the Specifications, the prices at which the printed copies of the latter are sold have been added.

The number of Specifications from the earliest period to the end of the year 1866 amounts to 59,222. A large proportion of the Specifications enrolled under the old law, previous to 1852, embrace several distinct inventions, and many of those filed under the new law of 1852 indicate various applications of the single invention to which the Patent is limited. Considering, therefore, the large number of inventions and applications of inventions to be separately dealt with, it cannot be doubted that several properly belonging to the group which forms the subject of this volume have been overlooked. In the progress of the whole work such omissions will, from time to time, become apparent, and be supplied in second or supplemental editions.

This volume contains Abridgments of Specifications to the end of the year 1866. From that date the Abridgments will be found in chronological order in the "Chronological "and Descriptive Index" (*see* List of Works at the end of this book). It is intended, however, to publish these Abridgments in classes as soon as the Abridgments of all the Specifications from the earliest period to the end of 1866 have appeared in a classified form. Until that takes place, the reader (by the aid of the Subject-matter Index for each year) can continue his examination of the Abridgments relating to the subject of his search in the Chronological and Descriptive Index.

In order that the reader may not be misled by the various instances in which the terms "ventilation" and "ventilating" are technically applied, it is deemed requisite to give a definition of the term "ventilation," with reference to the scope of this series.

Ventilation consists in the operation whereby the air, in a building, room, or similar confined space, when vitiated by combustion, by the breathing of men or animals, or by exhalations or vapours from organic bodies, or when charged with moisture or small particles of solid bodies, is *renewed* with purer air; or whereby the air, when unduly heated or cooled, is *renewed* with air of more suitable temperature. The term also necessarily comprises, in a subsidiary sense, treating or preparing the air—such as drying, moistening, heating, or purifying it—before its being thus applied.

While this definition covers the numerous modes of renewing the air for the purposes of animal life, it also embraces those cases in which it is renewed for storing purposes (in granaries for example), as most processes for keeping grain or similar organic substances consist in renewing the air surrounding them, and thereby conveying away the moisture that would otherwise ultimately conduce to their putrefaction. Many plans for drying articles and materials (such as textile fabrics) are carried on in large compartments or rooms, wherein the air, as it becomes saturated with moisture, is withdrawn or allowed to escape, whilst a fresh supply of dry air is furnished in its place, and these also find a place in this series of Abridgments; but small machines, in which currents of air are used for drying, as, *e.g.*, in some forms of centrifugal drying apparatus, are, however, excluded.

The mere technical use of the term "ventilating" does not give certain inventions a claim to come within the scope of the present series: hence it does not embrace the well-known process of "ventilating" the buckets of certain kinds of water-wheels;—nor the methods of "ventilating" fire-bars of furnaces;—nor the plans for "ventilating" millstones; unless indeed a given process embodied the intention of ventilating the mill and freeing it, for the sake of the millers, of the fine stive so injurious to health. There are numerous instances of manufacturing operations in which it is necessary, for sanitary purposes, to get rid of vapours and effluvia (as in melting tallow) or of fine solid particles (as in the dry grinding of grain, cutlery, needles, or quartz) evolved from the substances under treatment. Cases like these come within this series, but not those in which air is injected or exhausted in order to be actually utilized in mechanical processes. Hence are excluded the processes of ventilating or fanning, for the purpose of separating substances of different densities or of different volumes, such as the very ancient plan for separating grain from the chaff, and the more modern processes for sorting charcoal, dust, or hair.

Inventions for *preventing* the contamination of the atmosphere by the escape of noxious vapours or gases, or the mingling of solid particles with the air, are not comprised in this series; nor are those inventions which relate to fumigation or to the use of deodorizers and disinfectants.

As with most other classes of Abridgments, reference has to be made to other series. Anemometers, hygrometers, barometers, and even thermometers are instruments indispensable in ventilating operations on a large scale; but they should be looked for in the volume containing the Abridgments relating to "Optical, Mathematical, Nautical, and "Astronomical Instruments." Blowing engines are similarly sometimes used for ventilating as well as for supplying furnaces and in metallurgical operations; but these engines and all apparatus for forcing, compressing, or exhausting air (except when it is stated that they are to be used in the operation of ventilation as defined in this preface) are excluded from this series, and will be found in the volumes of Abridgments containing such classes of subjects. Methods of supplying diving bells and submarine boats with fresh air are included in the present work, but all other diving apparatus, including diving dresses and methods of supplying air to divers and others working in situations requiring a similar supply of air, are reserved for a special series embracing such inventions. Ventilating drains and sewers likewise are excluded, and will be found in the series of Abridgments entitled, "Tunnels, Subways, and Sewers." The open fire-place and chimney, and the adjustable window sashes of an ordinary English apartment, constitute an efficient ventilating motor with adjustable valves for the inlet of fresh air. The wards of St. Bartholomew's Hospital, one of the most important of the metropolitan hospitals, are thoroughly ventilated by means of the constantly open top sashes of the windows and by means of the spacious fire-places. Strictly speaking, therefore, some improvements in fire-places and stoves, or in the means of increasing the draught of chimneys (such as improved cowls) might find a place in this series ; but it is preferred to refer the searcher in this class to the series relating to the "Preparation and Combustion of Fuel." When, however, fire-places and stoves have ventilating apparatus applied to them, or when they form part of the proposed apparatus for ventilating, descriptions of them will appear in the present series. Similarly windows and doors, but only when specially fitted with ventilating apparatus, are included. The exhaust of an engine or machine working by compressed air necessarily has a ventilating action, as practically applied in boring the Mount Cenis tunnel; but a description of such an engine or machine (*e.g.*, the pneumatic shuttle) could not for the sake of such an incidental action find a place in this series.

It may be well also to state that respirators and inhaling apparatus are not included in this series ; nor are methods of supplying air to lamps ; nor improvements in the special manufacture of waterproof and other fabrics for the purpose of permitting the passage of air ; nor modes of "ventilating" garments, hats, gloves, boots, knapsacks, saddles, horse-collars, beds, mattresses, and similar articles.

The Abridgments marked thus (* *) in the following pages were prepared for another series or class, and have been transferred therefrom to this volume.

B. WOODCROFT.

January, 1872.

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INTRODUCTION.

NEARLY one-half of the trunk of the human body is devoted to inhaling and exhaling air, or to acts which take place at every moment of life,—only ceasing with death and the beginning of physical dissolution. "Probably between four and five hundred "cubic feet of air pass through the lungs daily." Most healthy men have as much as one hundred and sixty square yards of lungs; and the number of air cells have been estimated by Dr. Hale at no less than six hundred millions, the diameters of which, according to Professor Weber, vary between the seventeenth and two-hundredth of an inch. If we estimate the internal surface of a single cell to be about equal to that of a hollow globule of equal diameter, and accept Weber's opinion as to their number, we should then have, as the area of respiratory surface in the human lungs, upwards of one hundred and sixty square yards. By this extensive apparatus we continuously feed on the atmosphere as out of a great dish; for just as atmospheric air may be looked upon as the fluid combustible of the furnace, so the air we breathe is so far food, and food to be assimilated at every moment of life. Lavoisier states that the quantity of oxygen required by the same individual in activity and at rest is as 32 to 14; and that the amounts of his skin and lung exhalations increase in about the same ratio.

The ancients were well acquainted with the sanitary effects of the situations of buildings.—(*Vitruvius*, lib. I. cap. ii., iv., vi.; also lib. VI. cap. vii.) Celsus recommends a large room to a person ill of fever, and a fire to clear the air; but the value and hygienic importance of ventilation seem only to have been fully understood by the light of modern discovery in physical science. Hence, possibly, the devastating plagues of the ancient and middle ages. The disappearance of the last Great Plague from London after the Great Fire, mainly, we think, the result of the currents of fresh and purifying air induced by the gigantic conflagration, might have taught a great lesson in ventilation, if only people could see aught else but what previous thought has prepared them to see. Yet even now, the lighting of great fires at the corners of the streets of Buenos Ayres might have limited the recent (1871) ravages there of the contagious yellow plague.

Mainly under the impulse of the necessity of ventilating the Houses of Parliament, or of providing for the health of a numerous body of chosen men congregated together for many hours in one building, the art of ventilation has been particularly studied in England. Almost every device, as can be seen from the following compilation, has been tried therein at one time or other, and the history of the ventilation of the Houses of Parliament of Great Britain would be almost equivalent to a history of the art in its entirety.

Among other modes of ventilation, or, more properly speaking, of cooling, buildings, may be mentioned the *mulguf*, or wind conductor, of the ancient Egyptians, and still in use in modern Egypt. It was erected at the top of the house "and consisted "of a frame covered or enclosed on all sides, except at the "mouths, which were open in the direction of the prevailing "winds. The roof of the mulguf sloped down from each open "end to the centre, where a partition divided it, and deflected "the wind down into the apartments below. Mr. Wilkinson, "in his work on Egypt, gives a view of part of Cairo, shewing the mulgufs on the houses of the modern Egyptians. "The ancient mulgufs were double," "but the modern ones are "single, and the opening is in the direction of the prevailing "north-west wind. They consist of strong frame-work, to which "several planks of wood are nailed, according to the breadth "and length proposed; and, if required of cheaper materials, "reeds or mats, covered with stucco, are used instead of planks." (*A rudimentary Treatise on Warming and Ventilation, &c.*, p. 180. By Charles Tomlinson. 1850.)

From immemorial times the air has been cooled in India by hanging up at the windows or doors mats kept constantly sprinkled with water, and through which it has to pass into the apartment. These mats are termed *tatties*, and are "made of "fresh green bushes, or long roots, like snake-root." (J. L. L. Williams in the *Philosophical Transactions*, 1793, p. 131.)

Several cities in Greece were preserved during a pestilence by Hippocrates, and great cures effected by Varro, by ventilating by opposite apertures in the houses. (Varro, *De Re Rustica*, lib. 1. c. 5.)

The ancient Romans regulated the temperature of the Laconicum, or sweating stove, of their baths by placing an opening at the highest point of the ceiling, and regulating the exit of air from this opening by means of a valve. (*Vitruvius*, lib. v. cap. X.)

Marco Polo says that at Ormus, in China, the houses "are "provided with ventilators, by means of which they introduce "air to the different floors." (Marsden's *Marco Polo*, p. 374.)

A.D. 1253. "In the 'Hall of the Baths' in the Alhambra, at Granada, "the roof is perforated with ventilating openings, and "is not only of the best possible form, for the purpose "of ventilation, but the openings themselves are of the "best possible shape, being wider at the lower extremity "than at the upper; and in order that these openings "may present the least possible amount of friction to the "outgoing air, they are provided with short tubes of "baked earth, covered with a green vitreous glazing." (*A rudimentary Treatise on Warming and Ventilation, &c.*, p. 171. By Charles Tomlinson. 1850.)

1521. Agricola first thought of "causing currents of air by "means of fire." (*Dictionnaire Technologique, etc.*, 1824. Article "*Assainissement*," p. 278.)

1561. George Agricola describes and illustrates the applications of fire, of bellows, and of a rotating fan, to ventilating mines. (*De Re Metallica*, 1561.)

1594. Sir Hugh Platt, for the ventilation of noisome vaults, directs a vertical funnel, built to a convenient height, to be connected with the drain or vault, so that the offensive air can rise in the funnel and be dissipated in the atmosphere. (*On the History and Art of Warming and Ventilating, &c.* By Walter Bernan, C.E. (Robert Meikleham). 1845. Vol. I., p. 149.)

1614. B. M. Keslar publishes inventions of Italian stoves of different constructions indicating a knowledge of the circulation produced by heat of air. (*Dictionnaire Technologique, etc.*, 1824. Article "*Assainissement*," p. 280.)

1660. "In English houses there seems to have been no other "ventilating process except to open a door or a window, "or a hole in the wall or ceiling; and it was in this way "that Sir Christopher Wren attempted to ventilate "the House of Commons. At each corner of the house, in

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" the ceiling, he made a large square hole, which was " the bottom of a truncated pyramid that was carried " 6 or 8 feet into the room over the house, and could be " opened or shut, perhaps with a sort of lid. Through " these holes the breath of the people below, and the " steam of the candles, issued into the room in which the " pyramids were placed. But it often happened, that " when the pyramidal funnels were opened, the air above, " being colder and denser than what was in the house, " descended through the pyramids and annoyed the persons that sat beneath them. (*On the History and Art of* " *Warming and Ventilating, &c.* By Walter Bernan, C.E. " (Robert Meikleham). 1845. Vol. II., p. 39.)

1663. RAY examines a plan for natural ventilation adopted by the Trenti family in their villa at Castozza, and described by Palladio. From a spacious grotto near the palazzo were carried tunnels communicating with every room in the house. To cool the air in any room, a gate in the cave is closed, and a valve opened at the end of the fresh air channel. (*On the History and Art of Warming and Ventilating Rooms and Buildings, &c.* By Walter Bernan, C.E. (Robert Meikleham). (1845.) Vol. II., p. 107.)

1674. PAPIN constructs an improved air-pump, and publishes an account of experiments with it.

1706. Probably the first system for ventilating conservatories is described in John Evelyn's *Kalendarium Hortense*, p. 170. The fresh air was admitted at the ceiling, and the vitiated air drawn off below.

1715. Cardinal POLIGNAC, under the *nom de plûme* of GAUGER publishes a work, showing how air, when heated, rises by its rarefaction; the variations of the thermometer in different places and heights of the same apartment, &c. (*Mécanique du Feu*, 1715.)

1723. Dr. DESAGUILIERS states that he exhausted the heated foul air from the House of Commons by means of a furnace draught. (Desaguiliers' *Course of Experimental Philosophy*, 1744. Vol. II., p. 560.)

1727. Dr. DESAGUILIERS designs a set of air pumps for ventilating a mine belonging to the Earl of Westmoreland. It consisted "of a triple crank working three pumps,

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" which both suck and force air by means of three regu-" lators." (Desaguiliers' *Course of Experimental Philosophy*, 1744. Vol. II., p. 561.)

1736. A centrifugal exhaust fan applied by Dr. Desaguiliers to ventilating the House of Commons. He attempted to have it applied by the Admiralty to the ventilation of ships. (Desaguiliers' *Course of Natural Philosophy*, 1744. Vol. II., p. 563.)

1741. Chevalier MARTIN TRIEWALD applies ventilators to the war ships of the Swedish navy blockading St. Petersburg. The plan was approved in 1742 by the Academy of Sciences; and the King of France ordered all his ships to be fitted with these ventilators. Triewald's ventilators appear to have been somewhat similar to those of Dr. Hales, which were upon the general principle of construction of a common pair of bellows, the original invention of which cannot be traced. Triewald himself was resident for a number of years in England, and is stated by Farey to have been the first foreigner who studied the steam engine. (*A Description of Ventilators*, by S. Hales, 1743, p. xi.)

1743. Dr. HALES shews, in his work on ventilation, the hygienic necessity for ventilating buildings, ships; how to keep corn, gunpowder, hops, malt, &c. dry by renewing the air surrounding them; how to clear rooms of smoke by ventilation; and that meat can be kept sweeter and iron free from rust, by renewing the air. (*A Description of Ventilators, &c.*, read before the Royal Society in 1741. By S. Hales. 1743.)

1749. S. SUTTON ventilates ships by supplying the furnace for boiling the ship's copper with air from those parts of the vessel it is wished to exhaust the foul air. (*An Historical Account of a new Method for Extracting Foul Air out of Ships.* By S. Sutton. London. 1749.)

1753. SUTTON'S patent ventilating process successfully applied to the collieries of Balleroi, in Normandy, in 1753. (*Dictionnaire Technologique.* Article "*Assainissement,*" p. 285.)

1760. The system of "coursing" the air in ventilating mines, or of making an air pipe of every passage in a colliery, invented by Mr. Spedding, of Whitehaven, in Cumberland. (*Mr. Buddle's letter to Sir R. Milbanke*, 1813.)

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1775. The use of hot lime for purifying infected air described in the work by the philanthrophist **Howard** on the lazzarettos of Europe. It was applied by Mr. Day, a surgeon, in Maidstone prison. (*On the History and Art of Warming and Ventilating, &c.* By Walter Bernan, C.E. (Robert Meikleham). Vol. II., p. 68).

1777. Mr. **Adam Walker** revives the plan of thermo-ventilation; proposing to both ventilate and heat a house by a kitchen fire. (*A Philosophical Estimate of the Causes, Effects, and Use of Unwholesome Air, &c.* By A. Walker. London, 1777.)

Circa 1781. A plan of ventilating war ships, copied from a captured French frigate, introduced into the British navy. It consisted in fitting up trunks, running from the hold and opening into the air above. (Blaine on *Diseases of Seamen*, p. 216.)

1784. Mr. **Whitehurst**, of Derby, ventilates St. Thomas's Hospital. In every second window about an inch and a half of each pane in the bottom of the upper sash was cut away. A frame of glass, nearly two feet in width, was set across the window resting upon the top of the lower sash, and fastened to it by hinges. The frame moved on the hinges, so as to make a greater or less angle with the window, and by that means admitted more or less air at pleasure: and the air which entered between the sashes was directed by the frame towards the ceiling, and diffused through the rooms. (*Observations on the Ventilation of Rooms*, p. 21.)

1787. **Franklin** observes, in his "Philosophical and "Miscellaneous Papers," p. 12, "Take out an upper pane of "glass in one of your sashes, set it in a tin frame giving "it two springing angular sides, and then replace it, "with hinges below on which it may be turned to open "more or less above. It would then have the appearance "of an internal sky-light. By drawing this pane in more "or less you may admit what air you find necessary. Its "position will naturally throw that air up and along the "ceiling. This is what is called in France a *Was ist dass?* "As this is a German question, the invention is probably "of that nation, and takes its name from the frequent

" asking of that question when it first appeared. In
" England, some have of late years cut a round hole about
" five inches diameter in a pane of the sash, and placed
" against it a circular plate of tin hung on an axis, and
" cut into vanes, which being separately bent a little
" obliquely, are acted upon by the entering air, so as to
" force the plate continually round like the vanes of a
" windmill. This admits the outward air, and by continual
" whirling of the vanes does in some degree disperse it.
" The noise only is a little inconvenient."

1788. M. de Lyle de Saint-Martin describes a ventilating pipe or chimney, fitted at its outlet orifice with two caps or cowls, the upper one of which was closed. The wind blowing between the curved caps, a current up the stack is induced. He proposes to use it for ventilating mines, hospitals, &c. (*Journal de Physique*, 1788, Vol. XXXIII., p. 161.)

1800. Dr. Anderson describes a method of ventilating a building by means of the heat of the sun. (*Recreations in Agriculture*, Vol. III., p. 409.)

1807. Mr. Buddle invents the plan of employing a divided current in ventilating collieries. (*See his letter* (1813) *to Sir R. Milbanke.*)

1807. A ventilator, self-acting by the expansion of metal, was in use in 1807 by Mr. Porteus of Darlington. (Tredgold on *Warming and Ventilation*, 3rd edition, p. 219.)

1811. Sir Humphrey Davy conveyed fresh air for ventilating the House of Commons through brick flues, built alongside, and attached to the heating flues, and the air warmed by these means he admitted into the house by small perforations in the floor. In a letter to the Earl of Liverpool, on the ventilation of the House of Commons, he writes :—

" To convey fresh air into the House, I propose flues of
" single brick connected with the flues for sending hot air
" through the vaults under the floor, and I propose that
" this fresh air should be admitted by numerous apertures
" in the floor of the House, and supplied to the flues by
" pipes of copper or plate iron from the free atmosphere.
" The air in this case will be always fresh, and, by regu-

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" lating the fire, may be more or less heated, according as " the temperature of the room is low or high.

"To carry off the foul air, I propose two chimneys, or " tubes made of copper, placed above the ventilators, and " connected with wrought-iron tubes, which can be heated " by a small fire, if a great draught is necessary, as in cases " when the House is full.

" Should this plan be adopted, there would be no neces- " sity for opening windows; the foul air would be carried " off from above; warm air or cold air, whichever is " necessary, may be supplied from below, and there would " not be, as now, any stagnation of air."

1818. The Marquis DE CHABANNES employs the gas chandelier to effect a portion of the ventilation of Covent Garden Theatre. (*On conducting Air by forced Ventilation, &c.* By the Marquis de Chabannes, 1818.)

1818. M. D'ARCET shews the great necessity for ventilating workshops, and especially those in which operations are carried on whereby poisonous vapours are disengaged. He proposes and extensively carries out a mode of ventilating them by exhaust (*appel*) pipes connected with a heated chimney flue. (*Dictionnaire Technologique*, 1824. Article " *Assainissement*," p. 307.)

Circa 1820. " A steam engine was sent from England to move the " punkahs in the palace of the Nabob of Oude." (*The History and Art of Warming and Ventilating, &c.* By Walter Bernan, C.E., 1845, Vol. 11. p. 108.)

1820. The effluvia evolved in soap-boiling and tallow melting got rid of by Mr. Loudon. A pipe from the tight lid in the boiler conducted the exhalations into the ash-pit and through the fire into the smoke flue.

1821. By the same method of rarefaction, Mr. Tyers purifies some wards in Hackney workhouse that had been long most obnoxious from stagnant vapours. (Ure, *Philosophy of Manufactures*, 1st edition, p. 394.)

1823. Dr. MANNHEIM, of Aix-la-Chapelle, recommends the use of lime water in dishes in cellars where the air has been mingled with carbonic acid gas developed during fermentation. (*Baierisches Kunst und Gewerbeblatt*, 1823, p. 311.)

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1824. A self-acting ventilator, acting by the expansion of air, described by Mr. Mugliston, of Repton, near Derby, in the *Transactions of the Horticultural Society*, Vol. V., p. 502.

1825. FARADAY officially employed to fumigate the general Penitentiary at Milbank with chlorine. (*On Fumigation.* By M. Faraday, &c., *Quarterly Journal of Science*, Vol. XVIII., 1825, p. 92.)

1828. The Paris Bourse, or Exchange, warmed and ventilated according to the recommendation of a Commission composed of MM. Gay-Lussac, Thénard, and Darcet. Steam pipes are employed, round which the fresh air from below is caused to pass on its way into the building. (Péclet, *Traité de la Chaleur*, Vol. III., p. 126.)

1834. "In 1834 M. Motte received a prize for the application "of the Archimedes screw as a substitute for the fanner." (*Illustrations of the Theory and Practice of Ventilation, &c.* By D. B. Reid, 1844, p. 109.)

1835. Mr., afterwards Sir, GOLDSWORTHY GURNEY, proposes the use of steam jets for ventilating mines. (*Parliamentary Inquiry*, 1835, *Mechanics' Magazine*, 1843, Vol. XXXVIII., pp. 98 and 104.)

1835. The Russian General Sablukoff applies in 1835 a kind of Archimedian screw fan for ventilating. (*Die Ventilazion in ihrer Anwendung für öffentliche Gebäude, etc.* Förster's *Allgemeine Bauzeitung, etc.* Vienna, 1856, p. 51.)

1830–6. "ARTIFICIAL VENTILATION ON BOARD SHIPS. Artificial ventilation has hitherto been almost exclusively "effected by wind-sails on board ships; for, though "other methods have been proposed, they have either "not answered or have not yet been sufficiently tested "to show their effectiveness. Ventilation by means of "wind-sails is defective in many essential points. With "strong breezes, in dry weather, a sufficient volume of "pure air can be carried by them to, but cannot be "sufficiently diffused along, the decks. They can reach "only one point of the deck at a time; at that point the "force of the air in fresh breezes is too strong,—chilling, "and often communicating disease to the person on whom "it directly falls. Beyond that point it extends various

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“ distances, according to the force of the descending “ current, but does not extend far in between decks. “ Three wind-sails are generally employed, which are “ suspended from the rigging, pass down the hatchway, “ and terminate at any point between decks which may “ most require ventilation.” (*Statistical Reports of the Health of the Navy for the years* 1830-6. Introduction, p. 20.)

1836. The value in ventilating of sub-dividing the in-coming current of air into small streams, and thus avoiding draughts, first recognised by Clanelin, in his *Caminologie, Dictionnaire de Physique, Encyclopédie Méthodique.* (Tredgold on *Warming and Ventilating*, p. 95.)

1836. The fumes of nitric acid, as a means of destroying effluvia, “first employed by Dr. Carmichael Smith.” Chlorine gas was first proposed by Mr. Cruickshanks. (Tredgold on *Warming and Ventilating*, 1836, p. 90.)

Circa 1838. Thomas Tredgold proposes the use of an inverted syphon, fitted with one leg in the chimney of an apartment, for ventilating rooms with open fires. (*The Principles of Warming and Ventilating, etc.* By Thomas Tredgold, 3rd edition, p. 238.)

1839. Dr. Arnott ventilates the Custom House by affording an outlet to the air, as it got rarified by stoves, through several small casements made “ in the covered lights in the “ cove of the ceiling.” (C. Fowler in the *Transactions of the Institute of Architects*, Vol. I., part 2, p. 169.)

Circa 1840. In the northern lighthouses, ventilators, capable of “ being opened and shut at pleasure, so as to admit from “ without a supply of air when required, are provided in “ the parapet-wall in which the lantern stands; the lan- “ tern roof also is surmounted by” a ventilating cover; and the door from the lightroom to the balcony outside can also be employed for the same purpose. (*Account of the Skerryvore Lighthouse, etc.* By Alan Stevenson, 1848, p. 331.)

1840. M. Péclet directed by the Government to subject the public children's schools in France to a scientific inspection. As a result, he recommended plans for ventilating and heating them by means of stoves surrounded by a casing supplied with air from the outside. The smoke pipes of the stoves opened into a chimney, with which there communicated, on each side, a pair of boxes, formed at top and bottom of the room with openings regulated by dampers. (E. Péclet, *Traité de la Chaleur*. 3ième édition. Vol. III., p. 313.)

1842. M. Félix Leblanc publishes an important investigation into the changes in atmospheric air induced by the breathing and transpiration of men and animals. He came to the conclusion that the amount of carbonic acid contaminating confined air may be taken as the readiest exponent of its degree of vitiation. (*Recherches sur la Composition de l'Air confiné;* also *Annales de Chimie et de Physique,* 3 Ser., Vol. V., p. 223.)

1842. M. Mehn introduces steam-jets for ventilating the colliery of Grand-Horme. (*Jahrbuch für Fabrikanten, etc.,* von Hessler, Prague, 1843, p. 496.)

1842. Mr. T. Ewbank, in his well-known work on hydraulics after describing the induced or side currents which are produced by a fluid jet or current in motion, observes that :—" It is worth while to try whether wells, mines, and " the holds of ships could not be more speedily and " effectually ventilated by a similar device than by the " common wind sails used in the latter. These displace " the noxious vapours by mixing fresh air with them, " but by the proposed plan the foul air might be drawn " up alone, while the atmosphere would cause a steady and " copious supply to stream in at every avenue.

" If two or three exhausting tubes of metal or of any " other suitable material (whose diameter for a ship of " the largest class need not exceed three or four inches) " were permanently secured in a vessel, their lower ends " terminating in or communicating with those parts where " noxious effluvia chiefly accumulates, and the upper ends " leading to any convenient part of the deck, sides, or stern, " so that the blowing part could readily be slipped tight " into or over them, the interior might be almost as well " ventilated, even when the hatches were all down, as the " apartments of an ordinary dwelling. It appears to us, " moreover, that a vessel might by this means be always

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"kept charged with fresh and pure air; for the apparatus "might be in operation at all times, day and night, acting "as a perpetual pump in drawing off the miasmata. The "only attention required would be, to secure the blowing "tube in its proper position with regard to the wind during "storms. In ordinary weather its movements might be "regulated by a vane, as in the figure, when it would "require no attention whatever. The upper side of the "blowing part of the tube should be cut partly away at "the end, so as to facilitate the entrance of descending "currents of wind." (*Descriptive and Historical Account of Hydraulic and other Machines for Raising Water, ancient and modern, including the progressive development of the Steam Engine*, p. 488. By Thomas Ewbank, 1842.)

1842. "Fountains for cooling the air should constitute part "of the ordinary appendages to *churches*, as much as "apparatus for heating and lighting them. They should "be considered by us, as they were by the ancients, "*essential* to the *health* as well as comfort of large "assemblies of people. They certainly are as necessary "here [United States], especially in the Southern states, as "they were in Southern Europe. Their construction is "so simple, their modifications so various, their application so universal, and their effects so beneficial and "*cheap*, that it is surprising they have not been introduced. We don't see why a person might not be as "innocently employed in pumping water during worship "to supply a fountain or *jet d'eau* as in pumping air into "the pipes of an organ. But it is unnecessary, for where "the fluid would not rise sufficiently high from public "reservoirs or pipes that pass through the streets, it might "be elevated into a reservoir on the roof the day previous "to the sabbath. In this use of fountains ancient "architects were clearly in advance of ours.

"The custom of cooling the air in private apartments "is of great antiquity in Asia, and is still kept up in the "dwellings of princes. See a plate in *Génerale Histoire*, "tome XIII., p. 311, representing a private apartment "in the seraglio of one of the generals of Aurengzebe. "An octagon basin with a handsome jet is in the centre

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"of the room, with images of birds floating in the water. "On the borders of the basin are trays with refreshments, "and the company reclining around on carpets, much in "the same manner in which Pliny represents himself and "friends feasting around a fountain in his garden." (Ewbank on *Hydraulic Machinery and Steam Engines*, p. 540. 1842.)

1843. M. Dollfus makes some practical experiments for determining the best shape for a rotating fan. (*Bulletin de la Société Industrielle de Mulhouse*, Vol. XVII., p. 5.

1843. Faraday describes, before the Institution of Civil Engineers, his mode of ventilating lamp burners. He makes the hot air from the burner descend instead of ascend, by furnishing each burner with two concentric glass chimneys of unequal height, the lower one being the interior. The exterior or higher of the two chimneys is covered with a plate of mica. The descending current is to be first established by applying heat to the bend of a ventilating tube at the bottom of the two chimneys, and turning upwards. When this current is established, the gas is lighted, and the mica plate placed over the outer chimney. Each argand burner is supplied with air through the centre, and the products of combustion are carried from the top of the inner chimney, down through the space between that and the exterior chimney, then along the descending ventilating tubes up into a central vertical shaft. The products of combustion are received into a box above, and from this proceeds a pipe into the open air. (*Proceedings of the Institution of Civil Engineers*, Vol. II., p. 184.)

1843. Faraday, in a paper on the "Ventilation of Lighthouse "Lamps," describes "the points necessary to be observed, "and the manner in which they have been or may be "attained." In lighthouses with a single lamp in the centre of the lantern, the glass chimney of the lamp was lengthened out by a tube of sheet iron, and carried through the roof of the lantern into the open air, the upper extremity of this tube being defended by a cover. In lighthouses with several lamps a central chimney was also constructed, and over the glass chimney of each lamp

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was placed one extremity of a small tube. This tube was so curved that the other extremity opened into the central chimney. These tubes, one for each of the lamps, were supported by the frame which carried the lamps and their reflectors. As the frame revolved, the ends of the tubes each described a circle within the central chimney. The small tubes thus carried off the products of combustion without interfering with the reflectors. (*Proceedings of the Institution of Civil Engineers,* Vol. II., p. 206.)

1845. Pentonville Prison ventilated on the same general principles as those adopted in large coal-pits. (*On Modern Prisons, their Construction and Ventilation,* by J. Jebb; *Papers on Subjects connected with the Duties of Royal Engineers,* Vol. VII., 1845.)

1845. FARADAY, with Mr. LYELL, in a report to the Government and in a lecture at the Royal Institution proposes that in collieries "a pipe" (flexible) "should be laid "from the goaf into the upcast shaft, or into what is called "the return way, and either by a draft or some mechanical "means to draw off the air from the goaf." (*Civil Engineer and Architects' Journal,* 1845, Vol. VIII., pp. 115 and 118.)

1847. FARADAY lectures at the Royal Institution "On "Mr. Barry's mode of warming and ventilating the "new House of Lords":—"Having been officially called "upon in respect of Mr. Barry's arrangements, Mr. Fara- "day considered it his duty to acquaint himself thoroughly "with them, and the result of his investigation induced "him to bring these arrangements before the Institu- "tion as beautiful applications of a philosophical prin- "ciple. Mr. Barry's plan of warming and ventilating "the three rooms to which he has applied it (*i.e.*, the "Royal ante-chamber, the House of Peers, and the "public lobby) consists, first, in causing a current of "air of regulated temperature to pass beneath the imper- "vious floor of these apartments, and afterwards to rise "to a chamber at the top of the building, from whence "it is diffused in great abundance, but imperceptibly, "throughout the three apartments, and secondly in "drawing off the vitiated air and discharging it with "great rapidity into the atmosphere. To accomplish "these objects Mr. Barry has achieved expedients for— "1. Warming the building through an impervious floor, "as in the case of a Roman bath. 2. Effecting a system "of currents. 3. Providing means of causing ten "thousand cubic feet of air per minute, to proceed on "a prescribed course and with regulated velocity. 1. "Mode of warming.—A steam-cockle supplied from one "of Lord Dundonald's boilers, is traversed by a quantity "of air tubes firmly fastened into it. The air which "passes through these tubes is the source of warmth. "This apparatus with its furnace is placed beneath the "public lobby, and the current of warm air passes beneath "its impervious floor, then beneath that of the House of "Peers, and lastly beneath the floor of the royal ante-"chamber beyond. With warmth, the air acquires a "certain degree of motive power in the rising parts of "the passages, which carries it onward till it reaches the "reservoir chambers at the summit of the building; from "thence it is made to pass down into the apartments by "their walls, and so distributed, without draught, to be "breathed by the inmates of those rooms. This gradual "diffusion of the air is accomplished by—2. A system of "currents. These currents are caused by subjecting the "air to inequalities of temperature. Descending by the "walls of the building it is cooled by windows, &c., and "thus its velocity downward is increased. Arriving at "the level at which it is at once heated and deteriorated "by respiration, combustion, &c.; the air again rises in "the centre of the room, and passes through the ceiling "into a foul air chamber which is in connection with a "chimney. Through this chimney the air is driven by "the third expedient adopted by Mr. Barry, viz., draught "of the flue and a peculiar motive power. This motive "power is furnished by Bell's steam jet, a source of force "which has so many philosophical considerations con-"nected with it that Mr. Faraday expressed his intention "of making it the subject of a future Friday's dis-"course. He therefore limited himself at present to the "simple statement that steam produced under 32 lb.

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" pressure on the square inch will set in motion 217 times " its bulk of air. In the course of his communication " Mr. Faraday described the arrangements made by Mr. " Barry to clear the air and regulate its velocity so as to " prevent the possibility of draughts coming on any inmates " of the apartments. He showed how the steam-cockle, " employed to give warmth in winter, might by filling it " with water from the artesian well, become a source of " coolness in summer. These and many other important " arrangements were illustrated by sections in relief. Mr. " Faraday concluded by stating the following summary of " the advantages expected from the mode of ventilation " which he had described. 1. The prevention of local " draughts. 2. The prevention of the stains and disfigurements resulting from such draughts. 3. The avoidance " of all movement and dispersion of dirt and dust of the " House by currents occasioned by it, which currents, if " existing, would tend to render the air impure. 4. The " avoidance of all sudden changes of temperature. Finally, " it was noticed that all parts of the house were fire- " proof. Mr. Faraday then took occasion to remark that " this scheme of ventilation was under a disadvantage in " the present case, as it had to be adapted to buildings " which were not planned with reference to it." (*The Athenæum*, March 26, 1847, p. 367.)

1848. Mr. R. D. Mintura states that the ships of which he is owner had "for several years past adopted a mode of " ventilation with very great success, which has been by " inserting in the fore part of the vessel iron tubes com- " municating with the between-decks occupied by the " passengers; two tubes forward to receive fresh air, and " two after to discharge the foul air, so that a current of " air is constantly passing between decks." (*Report on Quarantine by the General Board of Health.* 1849, p. 106.)

1850. " A suggestion may be here offered, whether better pro- " vision might not be made for carrying off smoke and " vitiated air than has been usually attempted, and with- " out great increase of cost." Let "a square, round, or " oblong chimney, large enough for all the smoke of

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" a house, be carried up through its centre where the walls " intersect each other; or, in small tenements, in the " centre of one side. Let it be surrounded with venti- " lating flues of egress from the various rooms and carried " up, say, eight or ten feet above the ridge. Let all the " grates be of the register kind (or of the ordinary kind, " furnished with a tightly-closing chimney-valve), opened " only when in; and let their chimneys be carried up " straight to within a foot of the cornices of their respec- " tive rooms, at which point let them each turn off at an " angle of 45° upwards into the main chimney. Close " under the cornice over the grate, fix an Arnott's valve " or sliding regulator, leading into one of the egress ven- " tilating flues; a door should be left at the bottom of the " central main chimney for cleaning. By this plan, which " assimilates the chimney to that of a factory on a small " scale, the ventilating flues will be rarefied by the waste " heat of the fires; and if we suppose the kitchen to be " in one of the lower rooms, this rarefaction will be con- " stant. The divisions may be of stout sheet-iron, or of " slate." (*Useful Hints on Ventilation.* W. Walker, 1850, p. 67.)

1850. The "steam ventilator is in constant use at the Orrell " Colliery, near Wigan. A cylindrical boiler of 24 horses' " power, twenty feet long by six feet diameter, is set in " brickwork in the usual manner above the ground near " the mouth of the upcast shaft, which is 900 feet deep. " A pipe proceeds from this boiler down the shaft to a " depth of 600 feet, where it turns off into a drift or " passage sloping downwards, and leading into some of " the galleries of the mine. At a distance of 14 feet along " this drift the pipe is divided into four smaller branches, " each of which stands up across the drift, and is per- " forated with three apertures fitted with conical mouth- " pieces. These mouth-pieces or jets (twelve in number) " point upwards in a direction parallel with the floor of " the drift, and are so spaced in their respective pipes " as to be distributed equally over its entire sectional area. " The boiler supplies steam at a pressure of 50 lbs. per " square inch, which is considerably reduced before it

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" reaches the jets by condensation within the pipe, which " ought to be lagged. The steam issuing from these " jets expands conically, the bases of the inverted cones " of steam occupying space in the shaft, and acting on " the air as pistons; the jets by their upward force also " communicating motion to the air laterally, much in the " same manner that a running stream of water com-" municates motion in the same direction to standing " water in its immediate vicinity; or as the air in a " chimney is drawn out and carried on in the same " direction as the prevailing wind. Probably upward " motion is also imparted to the air on the principle of " continually-expanding concentric rings of steam curling " over each other as they issue from the jets, and drawing " air into the inverted cones of steam, whence it is driven " onward, as before described. These several causes " combine with the high temperature of the steam in " producing an upward motion within the main shaft; " just as the steam discharged from the blast-pipe into " the chimney of a locomotive causes a strong current " of air to follow through the fire-bars. The above " arrangement of steam jets and general mode of venti-" lation has been also adopted at the Seaton-Delaval " Colliery, near Newcastle-on-Tyne." (*Useful Hints on Ventilation.* By W. Walker, 1850, p. 76.)

Circa 1852. Mr. JAMES NASMYTH employed some time before 1852 a large "direct-action steam suction fan, for the ventila-" tion of coal pits." (*Mechanics' Magazine* for 1852, Vol. LVI., p. 502.)

Circa 1855. "A large old building, which had been formerly a " cotton mill, was fitted up as a barrack or dwelling-" house for persons of the working classes, and held " nearly five hundred inmates. As occurs in all foul " and crowded human dwellings, fevers and kindred " diseases soon became prevalent there. After a time " a medical man who was interested in the establish-" ment obtained permission from the proprietors of a " neighbouring chemical manufactory, in which there " was a lofty and very powerful chimney, to make an " opening of one foot in diameter into the side of the

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“chimney for the ventilation of the lodging-house. He then connected with this opening a main tube from the lodging-house, of which branches led along all the passages or galleries, and into there, from the ceiling of every separate room, there was a free way. Soon after to the surprise as well as to the delight of all concerned, serious diseases entirely disappeared from the house, and were never reproduced.” (*On the Smokeless Fire-place, Chimney-valves, and other Means, old and new, of obtaining healthful Warmth and Ventilation.* By Neil Arnott, p. 15, 1855.)

1855. Dr. Arnott’s Ventilating Valve.—“In sitting-rooms, bedrooms, nurseries, and enclosed spaces generally, where people assemble, the impure air of the breath, the burned air from lights, the odour of dishes, &c., because heated and therefore specifically lighter than common air, all ascend first towards the ceiling; but, as in ordinary rooms no opening exists there for escape (for an open window-top in a room which has an open fire-place only admits the cold air), they soon contaminate the whole air of the room down to the level of the chimney mouth, through which only can any portion ultimately pass away. In this way arises great, though often unsuspected injury to the health, and finally to the constitution of the inmates. The pale faces and scrofulous constitutions of the inhabitants of towns, and of others who live much within doors, are mainly effects of this evil. The ventilating valve is placed in an opening made from the room into the chimney flue, near the ceiling, by which all the noxious air above referred to is allowed at once, in obedience to the chimney draught, to pass away, but through which no air or smoke can return. The valve is a metallic flap to close the opening, balanced by a weight on an arm beyond the hinge. The weight may be screwed on its arm to such a distance from the axis, or centre of motion, that it shall exactly counterpoise the flap, but if a little further off it will just preponderate, and keep the flap, when not acted on by entering air, very softly in the closed position. Although the valve, therefore, be heavy and

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"durable, a breath of air suffices to move it; which if "from the room, opens it, and if from the chimney, closes "it; and when no such force interferes, it shuts. The "valve is so adjusted originally as to settle always in the "closed position. An important part of the arrangement "is the wire, which descends like a bell wire from the "valve to a screw or peg, fixed in the wall within reach of "a person's hand, by acting on which the valve may be "either entirely closed, or left free to open in any desired "degree. In cold weather, or with few persons in the "room, the valve, when opened only a little, allows as "much air to pass as is requisite. A flap of thirty-six "square inches area is large enough where there is "good chimney draught for a full-sized sitting-room with "company." (*On the Smokeless Fire-place, Chimney-valves, and other Means, old and new, of obtaining healthful Warmth and Ventilation.* By Neil Arnott, p. 34, 1855.)

1861. M. Péclet, in his work on heat, indicates several modes for heating an exhaust, or ventilating, chimney—*cheminée d'appel.* In one form, the air is heated by circulating the fire gases from a furnace through a number of horizontal tubes placed at the base of the chimney. (*Traité de la Chaleur,* 3ième édition, Paris 1861, Vol. III., p. 61.)

1863. An Act passed to compel manufacturers to consume 95 per cent. of the hydrochloric gas evolved from the sulphate of soda furnaces.

1863. M. Toni Fontenay proposes before the Society of Civil Engineers of France a process of ventilation consisting in inducing atmospheric air by means of a jet of compressed air. He projected applying it to the constructive works of the Mont Cenis and of the Simplon tunnels. It was afterwards carried out for the ventilation of the Paris Exhibition building of 1867 by M. Piarron de Mondésir. (*Mémoires de la Société des Ingénieurs Civils de France*, 1863, p. 206, and same *Mémoires* for 1867.)

1864. At Lille, in France, a municipal commission requires the inhabitants, whenever possible, to ventilate the closets by attaching an open tube from it to any adjacent chimney. (*Rapport sur assainissement industriel et municipal en France:—Par M. Charles de Freyeinet, Ingénieur au Corps*

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Impérial des Mines. Publié par ordre de son Excellence M. le Ministre de l'Agriculture, du Commerce, et des Travaux publics.)

1864. VENTILATING BARRACKS IN INDIA:—" Supposing the " barracks which are to be ventilated, arranged échelon, or " otherwise extending a considerable distance in line, as " barracks in India generally are," " a system of underground masonry flues must be constructed, consisting of " main flues from which proceed, at proper intervals, " barrack flues. The fans and other apparatus for supplying air at the end of the main flues should be placed " to windward, and about the middle of the line of buildings, 300 feet or more from the nearest barracks." " From " each barrack-flue, within the building proceeds a series " of diffusion-pipes" "of earthenware. These pipes " should be continued to the required height in the " masonry of the walls, or terminate in wooden ventilating " cases secured to the wall by iron clamps." The air escapes from the pipes in the wall, or from the ventilating cases, by means of a series of exit openings. These openings must be covered with perforated zinc plates of a watch-glass shape, or convex outwardly, so as " to diffuse the air in much the same way as water is thrown " from the rose on the spout of a watering-pot. These " openings should be at the apex of funnel-shaped cavities " in the wall." "The openings for the diffusion of air are " arranged in the barracks in the space between the doors, " and consequently between the men's sleeping-cots, one " opening being close to the floor, and another four feet " above it. The wooden ventilating cases " communicate " with the barrack-flue," and are provided at the proper " intervals with exit openings, in the same way as the " diffusion-pipes.

Besides the diffusion-pipes in the side walls, or the side ventilating cases, two or more diffusion-cases must be erected in each barrack according to its size. "They may " be constructed of masonry or other strong materials, " and should form ornamental tables; the interior consisting of a chamber" "with openings at the four " sides" "for the exit of air; these openings must be of “the same size as those in the walls and ventilating cases, and covered in the same way with perforated zinc plates and iron gratings. Each chamber should have at the bottom a trap-door valve, for the purpose of regulating the discharge of air.

“The great object of these diffusion-cases being placed in the middle of the apartment is, that the air issuing from them on all sides shall, on meeting the currents from the openings in the walls, cause numerous eddies and other irregular movements in the air, and thus produce thorough ventilation of every corner of the barracks. It has been estimated that, with the numerous openings, the ingress of air will be quite sufficient to supply at least 15 cubic feet to each man per minute—a quantity ample for all purposes. The volume of air, which should be completely changed in an apartment within a certain period, does not necessarily amount to the whole cubic capacity of that apartment; it is sufficient if it represents the cubic contents of the lower part, or that portion having for its area the length and breadth of the whole interior, and for its depth a little more than the height of a man, or, in round numbers, seven feet. This in a barrack having a ground area of 200 feet by 20, is equal to 28,000 cubic feet, a quantity which the apparatus in question would renew completely every fifteen or twenty minutes in ten such barracks.

“For the purpose of propelling the air, there are several different kinds of fans of excellent construction.” (*The Hygiene of the Army in India.* By Stewart Clark. p. 30.)

1864. COOLING THE AIR IN INDIA.—“For refrigeration, which will be more generally required in India than heating the apartment must be fitted with a series of Khuss Tatties * of sufficient extent to cool 20,000 cubic feet of air per minute from a temperature of 117°; for this purpose about 750 square feet of tattie will be required. If the cooling room be 23 ft. broad and 10 ft. in height,

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* The *kus-kus* is a sweet-smelling grass, of which refrigerating tatties or screens are made. In addition to cooling the air, the *kus-kus*, when kept moist imparts to it a delicious aroma. When the temperature of the air outside stands at from 100° to 120° Fahr., that inside may, by the aid of these tatties, be kept at 80° or even lower.

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"a tattie of this size would give a cooling surface of 250 "square feet, so that three such tatties would, according "to the above calculation, be sufficient; but for facility "of renewal, repairs, &c., the tatties must be made in "sections of about 25 square feet each part, and fitted "into framework, so that each large tattie would be composed of ten small ones of the above size. As a considerable portion of the dimensions of each tattie will be "taken up by the framework, it will be necessary to have "four rows." "The frames should be inclined at an "angle of 25° or 30°, so as to afford greater facility of "keeping the tatties wet. For this purpose inch-and-a-"half water-pipes should be laid under the floor of the "cooling-room; and others, three-fourths of an inch in "diameter, screwed on to these at right angles; the latter "must extend perpendicularly to within two feet of the "top of the tatties. These perpendicular tubes must be "perforated on the side facing the tatties, so as to throw "a regular shower of water over a given space, say five "feet in breadth and the whole height of the room, and "thus provide thoroughly for the tatties being kept constantly wet without the aid of manual labor." "An ice-"making machine might be used for cooling the air." (*The Hygiene of the Army in India.* By Stewart Clark, p. 41.)

1864. THE "VENTILATION OF TENTS."—"The ventilation of "tents, seeing that the cubic space per man is sometimes "as low as 77 feet, never more than, and very rarely so "much as, 220 feet, stands in even greater need of improvement than that of barracks. In the first place, the "construction of the tents now in use is defective, inasmuch "as they have not an opening round the pole in single-"poled tents, and along the whole length of the ridge in "double-poled tents, for the egress of the foul air. The "remedy for this very great defect is so simple, that I "think there must be tents with such openings, although "I have never seen any of them. It merely consists in "two feet of each fly round the pole in single poles, and "on each side of the ridge is double poles, being made "of strong rope lacing or network instead of canvas, with

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" a small canvas fly over all to keep out the wet. This " will form a roof exactly like in point of facility for ventilation the roof with open ridge in barracks. Canvas " so rapidly absorbs moisture, and along with it any impurities which may be suspended in it, that it is most " desirable that the vitiated air, which is saturated with " moisture should be got rid of without remaining in " contact with the cloth of the tent, and this will be " readily effected by its ascending direct into the open air " through the openings round the poles and ridges." (*The Hygiene of the Army in India.* By Stewart Clark, p. 49.)

1864. VENTILATION OF ST. GEORGE'S HALL, LIVERPOOL.— " St. George's Hall, Liverpool, the ventilation of which " was executed under the direction and supervision of the " late Dr. Boswell Reid, who ventilated several other " public buildings on the plenum principle, and very " justly stood high as an authority on questions of ventilation. In the ventilation of this building there are four " large fans, each ten feet in diameter, driven by a steam " engine, and making from fifty to sixty revolutions per " minute. They are placed about the centre of the building, " in the basement floor. These fans impel the fresh air " through a series of large horizontal flues or passages, " into which the greater part of the basement is divided; " and it is finally diffused into the great hall, courts, and " other apartments, through trellised work and openings " in the sides of the floors and walls, most of which are " covered with gratings. The flues are fitted with valves, " which are, in reality, large folding doors, arranged in " every conceivable position likely to be useful in giving " the air every required direction, and for affording the " ready admixture of heated air with the cold atmosphere. " By this means a uniform temperature of about 60 Fahr., " or any other required degree, can be maintained for any " length of time all over the building. The vitiated air " escapes through numerous openings about the cornices " and ornamental open work in the ceiling, into a large " air chamber between the arched roof of the great hall " and the outer roof of the building, and finally passes

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" through a large shaft into the open air. The foul air " vents and shaft are provided with gas burners, for the " purpose of creating a draught through; but I was " informed that it was very seldom found necessary to " light these burners." (*The Hygiene of the Army in India.* By Stewart Clark, p 56.)

1865. A plan for ventilating a water-closet by connecting it with a chimney flue, and thus causing an induced current, shown in "*A Treatise on the Sanitary Management and Utilization of Sewage, &c.,*" by W. Menzies, London, 1865, p. 11.

1865. The following is a description of a ventilating stove, as used in the Herbert Hospital, at Woolwich:—" The " flame, heated gases from combustion, and smoke are " compelled, by the form of the back of the grate and " the iron part of the smoke flue, to impinge upon a " large heating surface, so as to extract as much heat as " possible out of them before they pass into the chimney, " and the heat thus extracted is employed to warm air " taken directly from the outer air. This air is warmed by " the iron back of the stove and smoke-flue, upon both of " which broad flanges are cast, so as to obtain a large " surface of metal to give off the heat.

" This giving-off surface is sufficient to prevent the fire " in the grate from ever rendering the back so hot as to " burn the air it is employed to heat. The fresh air, " after it has been warmed, is passed into the room near " the ceiling by the flue shown in the drawing. The " object of admitting the fresh warmed air at the chimney " breast, and near the level of the ceiling, is because at " that point it flows most easily into the currents which " exist in the room; as it is found by experiment that in " a room with an open fire, and with the doors and " windows closed, the current of air is drawn along the " floor to the fire, where a portion passes up the chimney, " but the remainder is carried up the chimney breast " towards the ceiling, near which it passes till it ap" proaches the end of the room furthest from the fire, " when it again descends to follow the same course.

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"The recess in which the ordinary stove is fixed forms "the chamber in which the air is warmed.

"In order to afford facilities for the occasional cleansing "of this chamber, and those parts of the air channels "connected with it, the front of the stove is secured by "screws, so that it can be easily removed, thus rendering "the air-chamber accessible." (*Report to the Secretary of State for War, descriptive of the Herbert Hospital at Woolwich.* p. 28. By Captain Douglas Galton.)

1866. DR. PERCY in his official "Report on the Ventilation, "Warming, and Lighting of the Houses of Parliament," states that "the plan of mechanical propulsion by fans "has long since been abandoned there," "and the air "is now exclusively put in motion by means of heat, "precisely in the same principle as in most of our collieries." "Heat is applied by coke-fires of the simplest "construction. There are two great up-cast shafts, "namely, one of the turrets of the Victoria Tower and "the Clock Tower. There are also the following additional upcast-shafts, namely, the Peers' shaft, the Commons' shaft, the Speaker's shaft, the river front shaft, "the north end shaft, the west front shaft, and the Black "Rod-shaft."

"In the first two shafts there are coke fires for the sole "purpose of causing an upward current of air; but "within the other shafts are contained the terminal and "vertical portions of the smoke flues, and the movement "of the air upwards was dependent on the heat which "they communicated. Although coke fires are kept up "within these terminal portions of the smoke flues, in "order to increase the ascensional power of the smoke, "yet the temperatures of the sides of these flues, which "are of galvanized iron, is often too low to produce the "requisite effect upon the surrounding external air. In "one of these shafts, namely, the west front shaft, it was "ascertained that a current of cold air descended from the "top along the sides, while a current of warm air ascended "along the surface of the smoke flue. A special coke "furnace has been erected at the bottom of this great "shaft which will cause a vigorous current of air upwards,

“ and tend also to increase the draught of the smoke flue.
“ By this means great additional power has been obtained
“ of extracting the vitiated air from the Peers' Robing
“ Room and the west front. A similar furnace with the
“ same object has been erected near the Black Rod shaft.

“ The two systems of ventilation by mechanical pro-
“ pulsion and exhaustion have been actively discussed,
“ and each has its supporters. Both Houses of Parlia-
“ ment have condemned the former system and sanctioned
“ the latter, and it is satisfactory to know that one of the
“ highest scientific and practical living authorities on the
“ subject of ventilation, General Morin, has also decided
“ in favour of this system. When properly carried out
“ and carefully attended to, it is all that can be desired
“ both in regard to simplicity and efficiency. It requires
“ no machinery, and is not liable to any sensible derange-
“ ment, except during sudden gusts in tempestuous
“ weather, and the only labour which it needs is that of a
“ common stoker. There are other reasons of a purely
“ scientific nature, which in this report it is not necessary
“ to adduce. It is capable of ventilating the largest
“ collieries with all their intricate workings and roads,
“ often extending many miles in the aggregate. The up-
“ cast shafts now in operation at the Houses of Parlia-
“ ment would far more than suffice to ventilate buildings
“ covering a much larger area if suitable communications
“ existed between them and all the rooms and passages,
“ which unfortunately is not the case.

“ Some years ago ventilation by the steam jet excited
“ much attention, especially with reference to its applica-
“ tion to collieries. The mode of action of the jet is well
“ illustrated in the ordinary railway locomotive engine,
“ in which the waste steam rushes up the funnel and drags
“ after it the gaseous products of combustion, thus causing
“ an active current through the fire-box. The steam jet
“ has been made the subject of careful investigation by
“ eminent colliery engineers in the north of England, and
“ pronounced by them inferior to furnace ventilation. Sir
“ Goldsworthy Gurney was at one period the chief advo-
“ cate of the steam jet, and introduced it into the Houses

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" of Parliament, where it was for some time employed; " but long before he resigned his appointment, he had " completely discarded it." (*Parliamentary Paper, No.* 98, A.D. 1866.)

1867. COLLIERY EXPLOSIONS.—"The galleries of the slate " quarries of Angiers, France, are, or were until lately, " lighted by electricity. There can be no doubt that " collieries also could be at least partly lighted by electricity, " and, above all, that the electric light could be employed " to diminish the chances of explosion. The fire-damp in " the workings is even now, for instance, in some parts of " Staffordshire and Belgium, lighted by the miners on " purpose, in order to consume the carburetted hydrogen, " and thus prevent the presence, for the time, of a too " great quantity. By conducting insulated wires to the " 'headings' and intermittently putting on and breaking " the circuit during the 18 hours in the 24 that the men " are out of the pit, the dangerous fire-damp would be " burnt and the choke-damp, or carbonic acid gas, generated would naturally be at once got rid of by the usual " means of ventilation. A magneto-electric machine, " worked by the ordinary winding engine could easily " generate the electricity required. By letting the current " on at the proper intervals the fire-damp would be burnt " as soon as it accumulated, and there would be no danger " of injury to the roof." F. A. Paget, *in "the Times" of Dec.* 31*st* 1867.

1867. M. HAMELINCOURT, "in his design for the ventilation of " the GRAND OPERA, provides for separate systems of " ventilation in the summer and winter; in the one case " admitting the external air direct, in the other heated. " In both cases the fresh air is procured from an opening " at a considerable elevation to insure greater purity, and " enters the house between each tier of boxes. The foul " air is drawn downwards through openings in the floor of " the house, thence through flues which pass outwards to " the walls, then ascend and converge to a common central shaft over the dome of the house, which has an " outlet for the vitiated air under the cupola. The draught " in this great central shaft is promoted by the ascent of

> “ the heated air nearest the ceiling of the house, which
> “ has access to it through perforations. Thus it will be
> “ seen that the air is renewed by entering in a horizontal
> “ direction at the sides of the house and going out at the
> “ top and bottom, the movement of the air in the pipes,
> “ by which it is drawn down through the floor, being
> “ created by artificial heating. The success of such a system
> “ will depend on the complete but imperceptible changing
> “ of the air to meet fully the requirements of the largest
> “ audience; but it is imperative that the air drawn out at
> “ the floor should not contain the products of the com-
> “ bustion of the gas used in lighting the house.” (*Reports on the Paris Universal Exhibition*, 1867. Vol. IV., page 4, 1868.)

THE VENTILATION OF UNWHOLESOME MANUFACTORIES.—Some time ago M. Charles de Freycinet, *Ingénieur des Mines*, was directed by the then Imperial French Government to visit the most important manufactories in England, France, Germany, and Belgium, in order to report upon the means actually adopted in the more unwholesome operations for maintaining the health of the people employed. The results of his lengthy examination, apparently extended over several years, have been given in four very important reports, to which our attention has only lately been directed, and from which we propose to make some extracts, more particularly referring to ventilation, or renewal of the air, as a means of getting rid of injurious vapours and gases, or also of substances in a state of minute subdivision. A general and elementary means of preventing the infection of the air by deleterious vapours consists in the use of very high chimneys, which are generally acknowledged to be all the more efficacious for this purpose the higher they are; and that this is the case, not merely at a given point, but in the entirety of the circle of their action. All the new coke ovens erected in Belgium are now officially required to disengage their gases into chimneys at least 45 ft. to 60 ft. in height. The application of tall chimneys receiving the gas from a group of coke ovens has notoriously effected quite a change in the county of Durham, where sometimes as many as one thousand coke ovens are found congregated together. In the wine districts of France the smoke from lime and brick kilns has been found to injure the quality of the grapes, giving the wine made therefrom a sooty taste; so that unfortunate burners have been adjudged to pay considerable damages to the owners of neighbouring vineyards. Tall chimneys have thus been made a necessity, and the nuisance caused to the town of St. Etienne by the numerous coke ovens has been completely obviated simply by their use.

Ventilation by means of fans, acting either in the buildings or directly on the apparatus for manufacture, is in general use in French factories for the preparation of white lead, the torrification of tobacco, dressing of leather, and in woollen or cotton manufactories. The infection of the general atmosphere is prevented by the use of chimneys and of condensation by water of noxious gases. In the preparation of soda, high towers of masonry, filled with coke, are employed for condensing the fumes. It is well known that workmen silvering mirrors are liable to mercurial trembling produced by the vapours. At Saint-Grobain, Cirey, and Chauny, near Paris, the men are only employed at this work twice, or, at the most, thrice a week. All the windows are kept open in the wide and well-ventilated workshop. The flannel rubbers by which the mercury is spread over the tinfoil are fitted with handles nearly 4 ft. long. The mercury is kept in close cases, and the cloths through which it is passed in order to get purified are not beaten in the open air, but by a beater contained in an hermetically closed casing. Gilding with mercury, as is done by Messrs. Bonin and Co., of Paris, is rendered safer by covering the fire intended to vaporise the mercury by means of a glazed dome, surmounted by an open chimney. The man works by passing his hands under the casing, which extends below his chest. The workshop is also kept well supplied with fresh air. No means are said to have yet been discovered for rendering the manufacture of chromate of potash a wholesome operation. At M. Clouet's, of Havre, most of the men suffer from an actual perforation of the nasal membrane, which seems to be due to the suspension of particles of chromate in the air. Another very unsalubrious manufacture is that of quinine, which causes singular effects on persons brought within its influence. In both cases, however—and certainly in the latter, as we shall see by an instance further on—preventive means can be adopted. Another unwholesome and laborious operation is that of dressing millstones by hand—a process now much facilitated by the use of the modern diamond dressing machines. The working population of

La Ferté-sous-Jouarre, the well-known quarry of French burr millstones, is said to be decimated by the considerable disengagement of stone and steel-dust which takes place in dressing the stones. Ten years or so of work of this kind is said to often result in mortal disorders. The very fine charcoal powder used by bronze metal founders to dust their moulds is another instance of the insalubrious effects of fine dust mingling with the air; but for such moulds for bronze metalwork the use of potato-flour instead of charcoal dust has generalised itself in Paris with very happy results in this way.

The mills of M. Leroux, of Rennes, for grinding up bark, are fitted with exhaust fans and a sort of stive-room for gathering up the dust, which is considered at equal weights to be more powerful than common tan of the ordinary size.

In the cotton-spinning factory of M. Octave Fauquet, at Oisel, the principal room, 9,000 metres in area, devoted to carding and spinning, is built in a peculiar way, with the triple intention of obtaining a uniform temperature, carrying off the impurities, and keeping up a certain moisture in the air. In order to prevent variations in the temperature of the roofing, due to changes in the weather, the surface of the arches forming the ceiling was built up with ordinary glass bottles, placed alternately with the bigger and the smaller ends in the direction perpendicular to the surfaces of the arches aforesaid. The empty spaces were filled in with mortar; and on drawing out the bottles, there only remained a light and, so to say, spongy shell. On this was laid a continuous covering of plaster, and by this means a double ceiling was obtained, consisting of a mattress of air confined in a multitude of cells. All the double skylights are set in this ceiling. The air is renewed and the impurities are expelled by means of two large fans placed in a subterranean gallery. It is the fan near the carding machines that is most used to expel the dust. The circulation of the air is obtained by means of a system of conduits arranged under the flooring and opening into thirty gridded orifices. The moisture is obtained by injecting a spray of cold water into the gallery used for introducing the air. The arrangement is stated by M. de Freycinet to be a perfect success. In cigar factories it is not required to keep up a uniform temperature; and there is also much less dust than in cotton-spinning factories. It is, however, necessary to get rid of the emanations from the moistened tobacco and from the numerous persons engaged in manufacturing the cigars. In works at Bercy, Nantes, and Chateauroux, the air is sucked by fans from the outside; it circulates between the joists of the flooring on traversing the casings of the stove, where it gets heated in winter. Eight cubic metres of fresh air per hour are allowed per person. Each workshop has four heating stoves. Other conduits similar to those of admission are led to exhaust chimneys over the roof.

At M. Orsat's, of Clichy, white lead is ground between pairs of stones, the casing of which communicates with an exhaust fan. At M. M. Engler and Krauss, of Paris, who use lead paste for enamelling insulating brackets of telegraphic wires, the enamel is ground up in hermetically closed mills. The chambers for manufacturing chloride of lime at the works of M. Charles Kestner, of Thann, communicate by a leaden pipe with the chimney. One or two hours before the entry of the workmen a valve is opened at the same time as the doors. Suction sets up, and the gas is carried off by the chimney. The crucible furnaces for melting copper at the works of M. Maurel, of Marseilles, are placed in communication with the chimney of the steam boilers, which very effectually ventilates them. At the lead foundry of M. Lepau, of Lille, each of the melting furnaces is covered by a hood fitted with a register leading to a conduit opening under the ashpit of the steam boilers, so that communication can be cut off when not at work. The metalliferous vapours are thus thoroughly exhausted away. A somewhat similar process is employed by Messrs. Eschgar, Mesdach, and Co., at Biache Saint-Vaast. M. Lepau also condenses the fumes, as the different exhaust tubes open into a chamber underground in communication with the steam boiler ashpits.

Speaking generally, very happy effects result in factories for treating mineral oils, and other fatty substances, varnishes, or for distilling wood, or sulphuretted hydrogen, by leading the vapours to the steam boiler furnaces to be there consumed. This is applicable in nearly all operations exercised on organic substances, and a considerable saving of fuel is often the result. For instance, at the soap-boiling works of M. Evrard, at Douai, the pans are fitted with a cast-iron semi-cylindrical cover, movable round a hinge, which can be raised more or less as required. This cover is pierced with a hole by which the vapours can escape under the furnaces of the steam boilers; and at its end, the exhaust is intensified by a jet of steam. During the greater part of the time the cover is down, but when it has to be slightly raised for the introduction of the workman's stirrer, a cloth is lowered over the opening.

In Germany, and often under the stimulus of governmental interference, some very scientific mechanical and chemical means are adopted for preventing or carrying off injurious emanations. At Aix-la-Chapelle, the Prussian authorities have absolutely prohibited the grinding of needles unless the apparatus be furnished with a fan for exhausting away the fine particles of metal and stone thrown off in dry grinding. The Government requirements have also evolved two new machines for holding the needles mechanically. In the works of M. Schumacher, of Aix-la-Chapelle, for making steel pens, all the grindstones are fitted with fans. At M. Merck's pharmaceutical works at Darmstadt, where the poisonous belladonna is ground up in large quantities, a large bell, tightly jointed, suspended by chains from the ceiling, is lowered down on the mill after it has been charged with the belladonna, and is only raised up again when the grinding operation has been completed, and all the dust has had time to settle. Experience has shown that this bell should be even without doors in its sides, as, whatever care may be taken, the fine powder still manages to pass through. At the works of M. Piret Pauchet, of Namur, Belgium, tan bark for tanners is ground up in three horizontal pairs of stones. The substance is introduced by a hole in the thickness of the upper stone, and each apparatus is contained in a metallic casing, to which is fitted the supply tube for the bark. Another tube communicates with a powerful fan, which exhausts the fine dust and propels it into a funnel on an upper story. At chemical works at Mannheim, managed by M. Gundelach, the men required to repair the leaden chambers for the sulphuric acid, or for chloride of lime, are covered with a sort of close helmet, supplied with air from an air pump through a flexible tube. This is also done at Worms and at Heibronn.

The great extension of manufactures in Belgium, also coupled with a pretty stringent Government interference, have forced factory owners to have recourse to many ingenious means for obviating nuisances to the adjoining neighbourhoods. At the works for the concentration of sulphuric acid, held by M. de Hemptinne, of Molenbeck-Saint-Jean, near Brussels, the platinum retort is cased in with masonry. The dome is pierced with a large hole covered by an hermetically closed plate of lead. Within the space thus formed between the retort and its covering is inserted a leaden pipe carrying off the vapours into the chimney. At the large paper mill of M. Godin, of Huy, where the coarsest rags are bleached by means of chlorine gas, the gas is led into stone cases, air-tight, which can be put into communication with a central chamber about 30 ft. high, and by which a powerful suction can be set up. At Ghent, and also at Düsseldorf, whitelead is ground up with oil or water, in order to prevent the evolution of its injurious dust. Whitelead is used in bleaching lace, and so much disease was thus caused amongst the lace workers, that the Belgian Government raised the question whether its use for this purpose should be abolished. One process now used consists in beating the lace inside a casing hermetically closed.

In the manufacture of ultramarine, by M. Leverkus, of Opladen, it is ground up within closed apparatus containing fans. As already observed, a singular disease affects the workmen preparing quinine and its sulphate—so much used as a tonic medicine. Herr Zimmer, at Sachsenhausen, near Frankfort. grinds up the bark in a moistened state, the ground up materials being afterwards treated in closed casings. In purifying the raw sulphate, the evaporating pans are kept in a distinct workshop, and under a covering fitted with an exhausting chimney. Generally, the different operations are carried on by self-acting machinery. At the establishment of M. de Roubaix, near Antwerp, for the manufacture of phosphoric matches, the five separate buildings in which are carried on the successive operations are all ventilated by means of a large central chimney, receiving the fire gases from the steam boilers, and, if necessary, from a special furnace. A large underground channel runs along the opposite sides of each building, and opens into the chimney. Wherever the phosphorus is placed, an opening in the wall is made to communicate by a pipe with the subterranean channel, and thus leads away the deleterious vapour; the arrangements made for taking up the vapour vary with the nature of the operation. Thus, a large flat bell, set near the ground, is placed over the spot where the paste is formed. In the woollen factory of M. M. Hauzem, Gerard, and Co., of Verviers, the combing machines are set up in a separate building, and are provided with fans. In the spinning mill two powerful fans exhaust the air from the two ends, while several openings in the flooring allow the entry of fresh air. The woollen stuffs are spread on a grid covering a large casing closed up at its other sides. A fan powerfully exhausts from the inside of the casing, while a current of hot air is led against the ceiling of the building. By this ingenious plan the workmen are quite free from the unwholesome atmosphere generally present where the vapours are allowed to disengage freely. At Ypres, the lime which has served for purifying lighting gas, is, on cleaning out the cases, immediately mixed with the ashes from the fires, which process at once destroys all smell; and the mixture, kept in a well ventilated passage, causes no inconvenience, and is sold as manure.

In England, the manufacturers themselves holding, in many instances, the local government in their own hands, sanitary ventilation is too often neglected; though more favourable cases can be cited. Thus, fans are used at Messrs. Joseph Rodgers and Sons, of Sheffield, and at Messrs. Thomas and Sons, of Redditch, to exhaust away the fine particles of metal produced in the process of dry-grinding cutlery and needles respectively. The exhaust of the factory chimney is used for the same purpose at some other places. At the candle factory of Messrs. Price, of Battersea, the storehouse for the manufactured goods is ventilated by means of a cylindrical roof of thin plate, opening at the top into a number of small chimneys. The plate roof, getting heated by the least sunshine, a very powerful draught is created. The resulting effluvia on the River Thames are, however, sometimes very powerful. Manure factories in England are generally ventilated by chimneys of extraordinary height. In glue factories the vapours are burnt in the furnaces. At the manufactory of Mr. Crossfield, of St. Helen's, the chambers wherein the chloride of lime is made are in communication by an exhaust pipe with the chimney of the works. On opening an opposite door a current of air is set up, and the chlorine in excess is quickly exhausted. At Messrs. Elkington's, of Birmingham, the air of the workshop where the silvering is carried on is sometimes filled with the considerable amount of hydrogen disengaged by the decomposition of the water by the galvanic piles. It is got rid of by means of a column ventilator opening above the roof of the building. In the shops where the silvered or gilded articles are cleaned, the acid vapours are disengaged under domes in communication with one of the large chimneys, or with a pipe within which burns a strong gas flame.

Generally, it is by artificial ventilation that the preparation of leather, the grinding of needles, the manufacture of phosphorus matches, the spinning of textile fabrics, the grinding of bark, and in general operations giving rise to the evolution of vapours or of dust, have been rendered much more wholesome. In other instances, such as the manufacture of fulminate of mercury and the concentration of sulphuric acid, preventive modifications in the manufacture have rendered actual ventilation unnecessary. Enamelling iron plate, for instance, is a very unwholesome operation, especially when the enamel embodies lead, and even arsenic; but metal enamelling pastes and powders quite free from lead are now getting into use. Analogous to this is the substitution of amorphous phosphorus for the white kind. F. A. Paget, *in "the Engineer,"* 1872.

VENTILATION.

A.D. 1632, June 20.—N° 59.

GRENT, Thomas.—Of the numerous Inventions enumerated in these Letters Patent, the following alone relates to the present series:—"The fift, a moveable hydraulike or chamber wethercall, " like a cabinett, which being placed in any roome or by a bed- " side, causeth sweete sleepe to those which either by hott feavers " or otherwise cannot take rest, and withall altereth the dry hott " ayre into a more moistining and cooling temper, either with " musical soundꝭ or without."

No explanation is given in the Letters Patent of this invention. The Letters Patent for England, Ireland, and Wales were granted for fourteen years, conditionally on the payment during that term of "the yearely rent of twentie-sixe shillinges and eightepence of " lawfull money of England" being made into the exchequer.

[No Specification enrolled. Letters Patent printed, 4*d.*]

A.D. 1675, November 12.—N° 185.

WHARTON, Goodwin, PERKINS, William, and INNES, James, the younger.—This invention relates to a mode of "buoy- " ing and raising vpp of ships" and other matters from the bottom of the sea, "by the help of ayre conveyed under water, " as alsoe a new and easy way of diveing and living severall " houres vnder the water, by cureing the ayre conveyed downe " for sustenance, and thereby making itt fitt for refreshment of " the body whilst beneath the water;" and also "diverse engines " and instrumentꝭ" by the aid of which goods and merchandize " may with more ease bee landed on shoar, and likewise putt on " board, than ever yett hath beene experimented." No detailed description, however, is given of the invention.

[No Specification enrolled. Letters Patent printed, 4*d.*]

A.D. 1691, October 17.—N° 279.

EVANCE, Sir Stephen, TYSSEN, Francis, HOLLAND John, and HALLEY, Edmund.—"A certaine new engine or "instrument never hitherto knowne or practised, whereby by "conveying of aire into the diveing vessell they can maintaine "severalle persons at the same time to live and worke safely "under water at any depth for many houres together."

[No Specification enrolled. Letters Patent printed, 4*d.*]

A.D. 1691, October 19.—N° 283.

HOOKE, John, ATKINSON, Samuell, WEALE, Samuell, and NICHOLLS, Nicholas.—"A new engine by which a man "may stay and worke a considerable depth vnder water many "houres, being made of timber, with blasse windows, a doore and "severall aire pipes vnited, leather sleeves and iron braces affixed "thereunto."

[No Specification enrolled. Letters Patent printed, 4*d.*]

A.D. 1692, May 31.—N° 298.

THOMPSON, Isaac, GRAVES, Benjamin, JOELL, Thomas, and CUTHBERT, John.—"A new engine whereby a man may "be lett down vnder water, either in the sea or elsewhere, be the "assistance of a certain diveing habit which does well secure "them from the pressure of the water, and leaves their armes and "leggs naked and at liberty, and thereby and with the help of "another engine for pumping of air, the said person soe lett downe "may safêly continue fôr an houre at least vnder water, with great "freedome and clearnesse of sight, and be capable of doeing any "manner of worke dureing all that time, which will be beneficiall "and advantagious to all those persons whose businesse is to "search for and finde out wrecks and other things lost or cast "away at sea."

[No Specification enrolled. Letters Patent printed, 4*d.*]

A.D. 1693, March 17.—N° 318.

STAPLETON, John.—Improvements in supplying air to diving vessels, and in purifying the same. "A way to force air into any "depth of water, whereby the person in the aforesaid engine "may be supplied with a continuall current of fresh aire, which "not onely serves him for respiraĉon, but may also be vsefull "for continuing a lamp burning:" also "a way to defecate or "purify the air so as to make the same againe serviceable for "respiraĉon, and by continually repeating the operaĉon a man "may remain a long time vnder water in either of the said "engines without any other air than what the said engines do "conteyne, whereby he will be preserved from suffocation if any "extraordinary accident should interrupt the current of fresh air "afore-menĉoned."

[No Specification enrolled. Letters Patent printed, 4*d*.]

A.D. 1721, August 12.—N° 434.

DE LA CHAUMETTE, Isaac.—"A machine to cure chimneys "that smoak in windy weather, by a plate of tinn or iron at the "top of the chimney, half in and half out, hung vpon two pivots, "and which likewise serve to prevent the smell of necessary "houses." With many other inventions.

[No Specification enrolled. Letters Patent printed, 4*d*.]

A.D. 1744, March 16.—N° 602.

SUTTON, Samuel.—"A new invention or method for extracting "foul air out of ships, and will equally contribute to the removing "of all noxious air whatsoever, and may be conveniently applied "to mines and caverns in the earth, dungeons, prisons, and all "infected places."

[No Specification enrolled. Letters Patent printed, 4*d*.]

A.D. 1768, January 2.—N° 891.

LAYCOCK, Thomas.—"A new kind of window blinds for "coaches and other carriages, which will exclude sun and rain, "and admit of a free current of air." The shade blind is "to "slide down the groove," and to answer at once "as both a "shutter and a curtain." The shades "form a close panell in "the frame. When down, each lath of the blind" is "to turn "on a pin" "by which it is fixed to the frame." This pin may be fixed on or near the top or bottom edge, or in the middle of the lath; or "to the frame, hole, or socket, to the end of the "lath;" the shade blind is to be guided by a flexible string connected to the shade. At one end or side is a spring bolt or catch for keeping the blind close down or at different heights; and another spring latch, with a tooth rack may be used to keep the shades at different heights. "The shades may be kept down as a "panell by a button, and fixed to different degrees of elevation "by a hook."

[Printed, 4*d*. No Drawings.]

A.D. 1774, May 27.—N° 1071.

BLACK, George.—"A lock and latch to be affixed to a door, "for the purpose of raising the same from the floor over a carpet, "or to give air to a room without opening the door." A small part of the door at the bottom is to be made loose, in order to be raised and lowered as required for these purposes. Several arrangements, resembling each other in their general features, are described for raising and lowering this bottom portion of the door.

A rod of iron is to be placed within the door, "extending from "the centre rail" and with one of its ends fixed to this bottom part. Its other end is toothed like a rack and worked by a tumbler; and it is connected with another rod extending "from the "front end of the door to the centre, the one end rackwork, and the "other worked by the same tumbler." The front end of the rod is to be made in the same manner as the bolt of a lock, and it can be worked in the same way. Two plans differing but slightly in detail from the above, and one of which "may be used to doors "without taking of the locks then on the doors," are described.

[Printed, 4*d*. No Drawings.]

A.D. 1786, February 21.—N° 1533.

WALKER, Adam.—"An empyreal air stove, for the purpose of "purifying the air of churches, theaters, jails, sick and all other "rooms, and inclosed buildings." A stove, of metal or earthenware, with a fire-place "or repository for the heat" is constructed to hold one or more retorts "or bellied-pipes," open at both ends, for containing "the purifying ingredients." "Pipes of conduct," fixed to the upper part of the retort, convey the purified air to the top of the room, or in any other direction. These pipes are also made with cavities, "to contain herbs, essences, vinegar, etc." "To increase the draught of air" "or to extract bad air from the "holds of ships" conducting pipes on the lower end of the retort may be led through the floor or decks. The retort itself may also contain "nitre, minium, clay, or potsherds, or any other "ingredients that produce dephlogisticated air."

[Printed, 4*d.* No Drawings.]

A.D. 1789, May 12.—N° 1681.

WHITE, William.—A machine for expelling noxious air from any mine, ship, building, or other close place and introducing instead fresh cool air. It consists of a cylindrical drum, in which revolves a shaft carrying a number of radial blades driven by hand or other power; the air enters through an orifice in the centre of the end, and escapes through a pipe at the circumference of the drum. A perforated plate is sometimes placed in the pipe to modify the blast. Partitions are sometimes placed on the shaft to divide the fan into two or more parts.

[Printed, 10*d.* Drawing. See Rolls Chapel Reports, 6th Report, p. 180.]

A.D. 1793, December 9.—N° 1968. (* *)

GREEN, Joseph.—"Heating air for the purpose of warming "buildings by means of hollow vessels or pipes immersed in hot "water or steam" whereby "the air remains unburnt and fit for "respiration." For this purpose a worm or spiral pipe conveys the air through the centre of a boiler, and thence to the room to be heated; in some cases the steam from the boiler is conveyed in a larger pipe, which encloses the air pipe, for the purpose of keeping it warm; or the air may be contained in the outer and the steam in the inner pipe.

[Printed, 4*d.* No Drawings. See Rolls Chapel Reports, 6th Report, p. 188.]

A.D. 1798, December 8.—N° 2276.

RALEY, William.—Improvements in ventilating pits, mines, &c. A close furnace is used for this purpose, being supplied with the foul air from the mine, &c., by a pipe which enters the centre of the ash-pit; above the furnace is placed a boiler, the steam from which is employed to raise water by a pump or other means. The water so raised is used to promote ventilation, being let fall through a box or cistern into which the foul air is admitted at the top and carried out along with the water below.

[Printed, 4*d.* No Drawings. See Repertory of Arts, vol. 10, p. 155.]

A.D. 1801, November 3.—Nº 2549.

STEWART, David.—Improvements in ventilating hot-houses and other buildings. The foul air is carried off by vertical pipes, which extend from the floor of the building upwards through the roof, and are provided with a number of apertures at different heights fitted with valves, so that the air can be allowed to escape at any height desired. The fresh air is supplied by a pipe, the outer end of which is at the level of the ground, and the inner at the top of the building. A furnace may be used to heat the air, which is conveyed through a pipe which passes round the furnace, and is then allowed to enter the building. The smoke flue is passed round the interior of the walls.

[Printed, 4*d*. No Drawings.]

A.D. 1804, May 8.—Nº 2756. (* *)

MERRIMAN, Nathaniel.—A stove "for the purpose of clearing " away foul air." Round the back of the fire is formed a hollow chamber. A pipe which passes out of the room a little above the level of the head conducts the foul air into this chamber at the bottom; having been there heated the air passes off by a second pipe, which goes out of the top and discharges it at the level of the top of the room into the chimney.

[Printed, 6*d*. Drawing. See Rolls Chapel Reports, 6th Report, p. 202.]

A.D. 1805, June 20.—Nº 2860.

COLLINS, William.—Improvements in ventilators for tents and marquees.

"I take a strong cylinder, or I take a strong tube, of any " shape or form, made of metal or any other fit material, about " four or more inches long, and about two or more inches in " diameter, in the sides whereof I make three (more or less) " oval, oblong, or any other shaped perforations or apertures of " any convenient length, so as to admit the air freely to pass " through, and at the lowermost edge thereof I make several " holes for the purpose of admitting screws, by which means I " fix or fasten the ventilator upon the pole or poles of the " marquee or tent."

This cylinder is fixed to the tent pole, so as to be partly within and partly without the tent. The heated air passes through it.

[Printed, 4*d*. No Drawings. See Rolls Chapel Reports, 7th Report, p. 190.]

A.D. 1805, July 19.—Nº 2868.

SCHMIDT, Johan Gottlieb Fredric, and DICKENSON, Robert.—"Certain methods of sustaining animal life and com-"bustion for a great length of time, at considerable depths "beneath the surface of" "water, in such a manner as to enable "a person making use of such means to exist" "at the bottom "of the sea," "or at any required depth." The method employed consists in drawing upon a reservoir of compressed oxygen, and absorbing the carbonic acid evolved in breathing or combustion by means of "a caustic alcali, such as soda, potash, barytes, "strontia," or lime. "At considerable depths" recourse is had "to another reservoir containing a quantity of compressed azotic "gas."

A lantern, the flame of which is kept up on this plan, is particularly described. A cylindrical vessel, forming its bottom, contains oxygen. Above this is another vessel for holding the alcaline solution, and a glass bell above the latter encloses the lamp, which is supported by another glass vessel containing common air confined by mercury. On the oxygen being taken up by the flame, the air confined by the mercury getting expanded acts upon a float by which communication is formed with the reservoir of oxygen. To promote the absorption of the carbonic acid gas by the alcaline solution, perforated shelves are placed within the vessel containing the liquid.

Diving bells and submarine vessels are shewn, somewhat imperfectly, with apparatus for supplying an artificial atmosphere on this principle. The method employed with the lamp is apparently intended to serve as an intsance for all the other apparatus.

[Printed, 8*d*. Drawing.]

A.D. 1805, August 9.—Nº 2874.

COLLINS, William.—Improvements in ventilators for rooms and carriages and ships' cabins.

"I take or provide a circular box, made of brass or any other "proper material, of about an inch in depth, or four or five "inches in diameter, consisting of two rims, one larger than the "other; the larger one has the bottom to it, the lesser one I "make to turn in the larger one, to which I affix a pierced or "perforated front or top, which may be done to any pattern; to "the outer or larger rim I affix two or more tubes of a convenient

" length, at right angles, as large as the depth of the box will " admit of. On the inner rim I make holes corresponding to the " size of the tubes, which by turning round are made to close any one or more of the tubes at pleasure."

This ventilator is fixed in the roof of the room or carriage or sedan chair, and the hot air flows upward through it. When made of a large size, "both the top and bottom of the box may " be fixed to one rim, with large perforations in front."

[Printed, 4*d*. No Drawings. See Rolls Chapel Reports, 7th Report, p. 190.]

A.D. 1807, March 7.—N° 3018.

MABERLY, John.—" Making and constructing tents, poles, " and other machinery," so as to expel contaminated air. The top end of the tent pole is embraced by an iron tube, perforated with holes which correspond with similar holes in a cylinder closed at its bottom, contained in the iron tube. This tube is itself socketed into a conical cowl of wood, drilled out with a number of passages proceeding from the centre downwards from the apex of the cowl, which is thus closed at its top. The canvas of the tent is fixed below a projecting part of the cowl, and a leather conical ring is there secured in order to form a joint, or the tent cloth is fixed to a separate ring below the cowl; a shoulder on the iron tube bears against the bottom of the cowl; the tent pole is passed through the ring, and the cowl is put on afterwards. Tents that are not conical have such poles formed with a shoulder or pin and are passed through two rings secured at the ends of the ridge pole.

In all these instances the heated air is intended to flow out from the upper part of the tent up through the perforated pipe, then down the branched passages in the cowl out into the external air.

[Printed, 8*d*. Drawing.]

A.D. 1809, December 14.—N° 3287. (* *)

MURRAY, John, and **ANDERSON**, Adam.—" A stove or " furnace to produce ventilation as well as warmth." For this purpose the stove is constructed with a chamber round it, which is furnished with an aperture at its lower, and another at its upper extremity; the fresh air enters at the lower, and passes out heated at the upper; the lower orifice can be put in communication with the external air, and a pipe can be connected with the upper, so as to lead the hot air where required.

[Printed, 6*d*. Drawing. See Engineers' and Mechanics' Encyclopædia, vol. 1, p. 579.]

A.D. 1810, July 3.—N° 3358.

HOWDEN, Robert.—Improvements in ventilating mines, buildings, ships, &c.

1. The foul air is conveyed by a pipe into the chimney of an ordinary fire-place immediately above the fire, and a draught is produced in the pipe by the draught of the chimney.

2. A small furnace is placed in an enlargement of the air pipe and a draught is thus produced. The same purpose may be produced by a fan placed in the pipe or by a single or double acting pump.

3. For supplying hot air to buildings a stove is employed; it is encircled by a pipe through which air passes and is conveyed in a heated state where required.

[Printed, 8*d*. Drawing. See Rolls Chapel Reports, 7th Report, p. 209.]

A.D. 1813, March 13.—N° 3664.

DEACON, Benford.—Applying air "for domestic and manu-"facturing purposes." The leading idea of this invention consists in propelling air through tubes by means of a sort of fan with vibrating blades, termed an "euolian." The air is to be heated by utilizing the waste heat of manufacturing or domestic fires, or by forcing it through tubes "laid in hot water, horse "dung," or bark; it is to be cooled by forcing it through tubes "placed in earth, cold water, or between ice." Water to be used for heating air, can be forced through hollow fire-places, and tubular bricks of various shapes are used for conveying warm or cold air.

The drawings show a set of tubes, forming zig-zag partitions, apparently dipping into water, through which the air is to be propelled; a hollow fire-place forming a water boiler, containing tubes through which air is to be forced; a fire-place with an arched top, having hollow bars connected with the boiler, for the same purpose; a vase forming a water reservoir, consisting of an inner and a corresponding outer one, and fitted tubes being fired "by a common hall lamp" at its bottom, the heat from which passes between the outer and inner vase, out at a central opening at the top of the apparatus, and thence through the wall of the room; different forms of the "euolian," all embodying arrangements something like those of the common fan, with from one to four blades, except that, instead of the continuous rotation generally employed, the blades are vibrated to and fro.

A "rising valve" to prevent the influx of a draught through the bottom edge of a door is suspended by a rising arm, the end of the valve fitting close to a piece of iron screwed on the door post, so that it can be tipped up on opening the door, falling back on its being shut.

[Printed, 10*d*. Drawing.]

A.D. 1815, March 14.—N° 3898. (* *)

POTTS, THOMAS.—A means of heating air for the purposes of warming buildings by introducing the hot air and flame as it rises from the stove into a cylinder in a tangential direction; it flies round this cylinder and escapes by a flue at the end, and is then conducted to the room required to be heated.

[Printed, 6*d*. Drawing. See Repertory of Arts, vol. 28 (*second series*), p. 207; and Rolls Chapel Reports, 8th Report, p. 110.]

A.D. 1815, December 5.—N° 3963.

DE CHABANNES, JEAN FRÉDERIC, Marquis.—Improvements in ventilating apartments. This is effected by means of an air pump, by which the air is drawn up the chimney or other orifice, or by means of a flue placed at the top of the chimney, the sides of which round the upper orifice are formed of plates declining downwards and outwards, and which is covered over with a roof in a similar position, the wind blowing through is supposed to draw the air from the chimney.

This Specification also contains methods for preventing chimneys smoking (which is affected in a similar manner) and of purifying smoke; also of heating ovens and conservatories and of cooling fluids.

[Printed, 8*d*. Drawing. See Repertory of Arts, vol. 28 (*second series*), p. 321; Rolls Chapel Reports, 7th Report, p. 117.]

A.D. 1817, June 10.—N° 4133. (* *)

WHITTLE, THOMAS, and EYTON, GEORGE.—Kiln for drying malt. On the basement a furnace is erected with a flue, which winds above it round the bottom of a large flat boiler; the steam from this boiler communicates its heat directly to the floor of the kiln which is above it, and then passes off through four pipes, which pass through the corners of the floor and unite at the top of kiln above; air is introduced through the floor by means of pipes which pass through the boiler, and the air so heated passes into the kiln through the interstices of the bricks which form its floor.

[Printed, 10*d*. Drawing. See Repertory of Arts, vol. 33 (*second series*), p. 13; Rolls Chapel Reports, 8th Report, p. 121.]

A.D. 1817, August 5.—N° 4147.

STRATTON, George.—Improvements in ventilation.

"The mode which I adopt for the heating and ventilating "buildings, and particularly of hot or forcing houses, is by "causing a current of common atmospheric air to proceed into "the building intended to be heated through passages, as pipes "or tubes, &c., which are encompassed with steam, and by that "means throwing a considerable quantity of heat into the volume "of atmospheric air so conducted without taking up the oxigen "or altering its nutrative qualities."

[Printed, 6*d*. Drawing. See Rolls Chapel Reports, 8th Report p. 121.]

A.D. 1817, December 19.—N° 4192.

DE CHABANNES, Jean Fréderic, Marquis. — (*Partly a communication.*) — Ventilating apartments, ships, mines, &c., by means of a lamp or fire which, being placed in a tube in communication with the place to be ventilated, will cause a draught from it into the external air; or by means of a "ventilating air pump "similar to a winnowing machine."

The air may be purified from dust by causing it to pass through a number of screens of fine wire.

[Printed, 1*s*. Drawing. See Rolls Chapel Reports, 7th Report, p. 119.]

A.D. 1819, April 28.—N° 4362.

WILCOX, Thomas.—"Pnuematic stove for heating atmospheric "air and diffusing the same through houses, hot-houses, green- "houses, and other buildings, upon the principle of introducing "a column of atmospheric air into a chamber containing a stove "of a new and peculiar construction, thereby creating a reservoir

" of hot air capable of being diffused by means of flues through-" out buildings of any dimensions."

The leading features of the patent are fairly enough defined by its title. The iron stove is cast with a circular fire-box tapering upwards, where it terminates in a serpentine pipe, with three bends, the last opening into a smoke-flue. The bottom bend has a cleaning pipe connected to its sides. The stoking place is hopper-like; above it is the charging door. The brick or stove chamber enclosing this stove is supplied with cold air admitted through an opening below the floor at the under side of the ash-box; the air making its way past the entire heated surface up into a flue at the top whence it is led in any required direction. An outer door in the casing, giving access to the fire-place of the stove, is fitted with a small regulator at bottom for the inlet of air. The ash-box rests on small pillars; on it is fixed a bearing plate for the bars; and the bottom bend of the fire-tube rests on a curved plate cast on the bottom plate of the ash hole.

[Printed, 6*d*. Drawing.]

A.D. 1820, June 20.—N° 4479.

VALLANCE, John.—Improvements in ventilating buildings.

The air is forced by pumps through apertures in the floor or in the skirting, and escapes through apertures in the roof. When it is desired to heat the air it is made to pass through pipes surrounded by steam or some heated fluid; and when cooler air is required it is passed through cold water or is first compressed and thus heated, then cooled down to the ordinary temperature and finally injected in an expanded state into the apartment. The doors of rooms are made of a cylindrical shape with segmental apertures for ingress, so arranged that a draught of air can never flow through.

[Printed, 10*d*. Drawings. See London Journal (*Newton's*), vol. 2, p. 26; and Mechanics' Magazine, vol. 1, p. 72.]

A.D. 1821, June 20.—N° 4564. (* *)

VALLANCE, John.—Cooling the air in buildings. For this purpose a cylinder is employed which can be raised and let fall and which works on a fixed upright piston; the air is admitted into this cylinder through a valve, which opens inwards in its upper side; when it is let fall the air is compressed and heated, and escapes through a small pipe which passes through the fixed piston; it is thence conveyed into a coil of small pipe in a chamber where it is cooled by cold water or a freezing mixture; it is then readmitted with or without fresh air into the building. Water is used as a packing between the cylinder and piston.

2. Air thus cooled may be employed to preserve meat by being made to play round it; or carbonic acid or carbonic oxide gas may be treated and employed in the same manner.

3. A coil of small pipes may be similarly applied to cool liquids, and its passage may be expedited by exhaustion at the exit end.

[Printed, 1*s*. Drawing. See London Journal (*Newton's*), vol. 3, p. 292.]

A.D. 1821, November 1.—N° 4605.

ARCHBOLD, John Frederick.—“A new mode of ventilating
“ close carriages.”

“The air already in the carriage is abstracted by means of
“ pipes or tubes passing from the inside of the carriage through
“ the side or front thereof into the lamps, by which means, when
“ the lamps are lighted and the air therein thus rarefied, the air
“ from the inside of the carriage will pass out through the said
“ pipes or tubes into the lamps, and thence through the apertures
“ in the upper parts of the said lamps.”

“The place of the air thus abstracted will be supplied from the
“ outside of the carriage by means of an open tube or tubes
“ passing from the outside of the carriage to the inside.”

[Printed, 4*d*. No Drawings. See London Journal (*Newton's*), vol. , p. 304.]

A.D. 1825, June 9.—N° 5184. (* *)

BURRIDGE, John.—Improvements in bricks, having for their object the ventilation of the timbers built into walls so as to preserve them from decay. Several forms of bricks are shown and described, all having grooves or channels or bevels formed in such a manner that by the introduction of these bricks into a wall,
“ apertures for the admission and passage of air can be so placed
“ or arranged that ventilation may be produced in any part of a
“ house at pleasure.” Any other forms of aperture may be adopted by which the same principle can be carried out.

[Printed, 6*d*. Drawing. See Repertory of Arts, (*third series*). p. 270; London Journal (*Newton's*), vol. 11, p. 172; and Register of Arts and Sciences vol. 3, p. 23.]

A.D. 1826, April 22.—N° 5348.

WOOD, William.—"An apparatus for destroying the in-"flammable air (which is commonly known by the name of fire-"damp) in mines." The fire-damp is ignited at a determinate time by means of clockwork attached to an apparatus connected with a match.

An ordinary Dutch clock has a weight connected with the striking movement. On the descent of this weight after a given interval of time it comes in contact with a small lever, vibrating on an axis, and carrying another similar lever fitted with a small connecting rod attached to a vertical rod sliding in guides, and to which is fixed a match "made in the usual manner with "oxymuriate of potash." A small phial, containing sulphuric acid, is arranged immediately below this match, which is made to dip into it on the levers being depressed by the weight. At the other end of the match is a hank of cotton, dipped in turpentine which is to be ignited by the match. Disposed through the workings where fire-damp is supposed to be, is a wire carrying festoons of cotton yarn, or covered with thin brown paper dipped in spirits of wine or turpentine, and in connection with the match to be ignited by the descending weight in the absence of the miners.

[Printed, *6d.* Drawing.]

A.D. 1828, August 28.—N° 5690.

STRATTON, George.—"My improvements in warming and "ventilating churches, hothouses, and other buildings, consist "in the construction of an apparatus having one or more spiral "channels through which atmospheric air is to be passed. These "spiral channels being surrounded by a hot medium produced "by a close vessel containing steam."

"The ventilator is formed by two perforated circular plates "sliding round upon their centre, or by other sliding apparatus "of the same kind, by which the quantity of heated air passed "from the apparatus may be regulated."

[Printed, *6d.* Drawing. See Repertory of Arts, vol. 8 (*third series*), p. 454; London Journal (*Newton's*), vol. 3 (*second series*), p. 97; and Register of Arts and Sciences, vol. 2 (*new series*), p. 337.]

A.D. 1832, June 5.—N° 6273.

SYLVESTER, John.—"Improvements in apparatus for raising "the temperature of air to warm and ventilate buildings."

The first part applies to a grate in which the fire is on a level with the hearth. Under this grate is an excavation, for the twofold purpose of an ash-pit and supplying air to the bottom of the fire. The fire-bars are placed with their back ends resting upon the back brim of the ash-pit. From the front part of each fire-bar is made a prolongation bearing over some portion of the common hearth. Each prolongation is widened from the fire-place outwards so much that all the prolongations taken together form one continuous plate in front of the fire-place level with the floor. Along the under side of each prolongation is a groove, which, by lying on its bearings, forms a tubular perforation for the admission of air to the ash-pit, and thence to the fire, and for the emission of warm air into the room. The front line of the hearth may be either straight or curved. In order to open the ash-pit to remove the ashes, some bars are left unfastened.

The second part consists in attaching to the sides or back, or both, and extending as high as the situation will permit, a vessel for holding water to be heated by the fire. Near to the outside of this vessel is applied the system of tubes used in an apparatus "described in a work published in London in 1819," by Charles Sylvester. Its principle is that currents of air are made to pass through tubes and to impinge upon the outer surface of a heated cockle. In this improvement currents of air are directed through tubes similarly placed, but the air impinges against the outside of the vessels of heated water.

"Whenever it is desirable to keep up a large fire in the grate " for transmitting the heat" "to distant apartments without " giving out too much heat to the room in which the grate is " fixed," a cover is made "to fit over and in front of the fire, " having a doorway through which fuel may be supplied."

[Printed, 4*d*. No Drawings.]

A.D. 1832, June 22.—N° 6278.

GARSED, Edward, and ROBINSON, Alfred.—"Certain " improvements in apparatus for heating, warming, and venti- " lating drying houses, rooms, buildings, ships, and mines." A number of tubes, through which the air is circulates, are placed in a stove or furnace, and surrounded by the flames therefrom. The tubes, of cast iron, are arranged in parallel horizontal rows, and are open at each end. Below them are two furnaces, the fire gases from which circulate in a zig-zag direction to and fro above and below the tubes, escaping, after passing over this top range, at a chimney above. The air is conducted "to one end of each " tube, and may be allowed to discharge itself from the reverse " end of the tube into a hot-air chamber, which may have pipes " leading to the place " to be warmed. Or conducting channels may be led from the outer atmosphere, supplying boxes placed in plan diagonally opposite each other, and opening into the tubes. After passing through them, the air thus heated flows into the apartment. This plan is more especially intended for the case " of its being found most convenient to erect the stove near the " middle of the building ;" but the boxes may also be adapted to only one end, the air in all instances flowing straight out at the other.

[Printed, 8*d*. Drawing.]

A.D. 1834, January 18.—N° 6544. (* *)

MORGAN, William.—" An apparatus for heating and venti" lating churches and other buildings."

Air, water, or steam are used as the heating media; where water is employed it is heated in a boiler made in two parts, the upper being a steam chamber, and the lower containing water; the fire-place is placed inside the boiler, and has a smoke-box above it, also inside the boiler. The circulating pipes pass out at the top and return at the bottom of the boiler. Air may be heated in the same manner, but a fan is used to promote circulation. The fire is fed from a number of boxes placed at the top of the stove, and constructed with falling bottoms supported by checks; these checks are connected by cords to the weights of a clock, and are withdrawn consecutively; the coal in them falls through a trap-door, which closes after the coal has passed so as to exclude the air.

[Printed, 1*s*. Drawing. See London Journal (*Newton's*), vol. 5 (*conjoined series*), p. 26; and Rolls Chapel Reports, 7th Report, p. 149.]

A.D. 1834, August 12.—N° 6658.

WARD, James.—Improvements in regulating the ventilation of buildings according to the temperature. The ventilator consists of a square frame with slots running from side to side, covered by a sliding plate with similar openings, which can be made to coincide with and so open the orifices in the fixed plate when desired, or vice versâ; a circular plate with radial apertures is sometimes used. The sliding plate is actuated by a rod, connected by means of compound levers with the end of a metal bar, which expands by heat, and gives motion to the series of levers, the fulcrum of the first of which is on the end of a wooden frame, within which the bar is placed. Adjusting screws are provided so as to cause the ventilator to be closed at any temperature desired.

[Printed, 8*d.* Drawing. See Repertory of Arts, vol. 3 (*new series*), p. 321; London Journal (*Newton's*), vol. 10 (*conjoined series*), p. 94; and Rolls Chapel Reports, 7th Report, p. 154.]

A.D. 1834, December 4.—N° 6726.

BERNHARDT, Franz Anton.—" Improvements in warming " and airing buildings."

The building is heated by a furnace placed in the basement, the heated air being conveyed to all the apartments by flues, and allowed to escape into any room desired through valves provided for that purpose. The cold external air is also conveyed by separate pipes to each room, and allowed to escape in the same manner. Pipes are placed above the gas burners to carry off the burned air. Hoods are placed above the beds in sleeping apartments, and pipes fixed above them to convey away the impure air.

[Printed, 1*s.* Drawings. See London Journal (*Newton's*), vol. 10 (*conjoined series*), p, 456; Mechanics' Magazine, vol. 23, p. 165, and vol. 28, p. 274. See also Act of Parliament, 6 & 7 William 4, cap. 20 (1836).]

A.D. 1835, August 10.—N° 6875.

DOUGLAS, John Cooper.—Improvements in ventilating mines and buildings.

1. For the purpose of producing ventilation in the " goaves," or that portion of coal mines from which all the coal has been removed, strong pillars or walls of masonry are built in such a manner as to support the roof and to form air courses, so as to lead the air into the back of the " goaf," and prevent the accumulation of gas; metal pipes may be used for the same purpose. In working a new mine all the coal may be at once removed, and these walls substituted for the pillars.

2. In order to obtain motive-power from the current of air in the up-cast shaft, a wheel or other appliance, which will be moved

by the draught, is fixed in the shaft between the furnace and shaft mouth, and is connected to the pumping or other machinery.

3. For ventilating rooms a circular glazed chamber is formed in the centre of the ceiling, and the gas burners by which the room is lighted being placed within it, the air will rise through it and be carried off by a pipe to the external air; a fan may be placed in the pipe which will be actuated by the current of air, and may be connected with an air pump to promote ventilation.

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1837, February 20.—N° 7307.

BAILLIE, Benjamin.—" My invention consists in an improved " ventilator, by means of strips, squares, or quarries of plate, " crown, coloured, or other glass, also of any other transparent " or partial transparent substance, either fixed in metallic or wood " frames, or acting without such frames by means of sockets " either of wood or metal fixed on, over, or into such strips of " glass, squares, or quarries, or metallic or wood frames as afore- " said, and so arranged as to resemble the well-known loover " board or luffer board ventilators."

[Printed, 6*d.* Drawing. See Repertory of Arts, vol. 8 (*new series*), p. 280.]

A.D. 1837, November 16.—N° 7479.

FOURNESS, William.—Improvements in ventilating mines, buildings, kilns, &c., consisting in applying a rotary fan to exhaust the air from the up-cast shaft of the mine, or from the building or kiln by means of a pipe. To provide for ventilation in the mine when the fan may be stopped, a communication may be opened between the up-cast shaft and the furnace, and steam injected by a perforated pipe into the up-cast shaft, so as to render the gas inexplosive before passing through the furnace.

[Printed, 1*s.* 8*d.* Drawings. See London Journal (*Newton's*), vol. 13 (*conjoined series*), p. 57.]

A.D. 1837, November 16.—N° 7480.

BUCKINGHAM, James.—Improvements in ventilating mines and ships' holds.

" The first of which consists in the adaptation of a rotary fan " or blower contained in a close casing, which fan as it revolves " draws or exhausts the air by means of an exhausting pipe, one

" end of which is open at that part of the mine which is required " to be ventilated, or the foul air removed, and the other end is " open to the apparatus only."

The close casing is itself contained within another, into which the air is supplied, to enter by two central orifices in the inner casing. Or the air is supplied to the fan wheel round its axle by branch pipes, the foul air being driven off from all parts of the fan's periphery.

"The second arrangement, construction, and adaptation of " apparatus is a double-acting bellows for gaining a continuous " draught.

"The third improved construction and arrangement of apparatus is a rotary fan wheel or blower having its fans placed " in an oblique direction to its axis, which fan wheel is enclosed " in a box or case at the top or the end, or any other convenient " part of the draught pipe, such oblique fans exhausting and " forcing the foul air."

[Printed, 6*d*. Drawing. See London Journal (*Newton's*), vol. 12 (*conjoined series*), p. 341.]

A.D. 1837, December 19.—N° 7514.

BERINGTON, James, and RICHARDS, Nicholas.—"Improvements in curing smokey chimneys," "also applicable to " the purposes of ventilation." They are to be applied to an ordinary chimney and open grate.

"To allow of ventilation, and to regulate quantity of ventilation " when the fire is not used," a register is employed. It can be made to completely close the chimney, or the register can be set to allow the passage of more or less air upwards.

The cure for smoky chimneys consists in making the fire gases pass up through three or more pipes, bent so that their mouths are at about a right angle with the transverse sections of the chimney throat.

The apparatus is fitted on a cast iron plate, set inside the chimney, just below the mantelpiece, and cast with grooves at the sides, into which the plate forming the register can be slid so as to completely close up the chimney opening.

[Printed, 8*d*. Drawing.]

A.D. 1838, June 7.—N° 7675.

HADDAN, John Coope, and JOHNSTON, John.—"Improvements in warming, lighting, and ventilating," the general feature of which consists in causing the heat of gas flames "to "force various currents of air to ascend into and out of, and to descend within, a room of a dwelling house." An improved candle lamp, to be used solely for lighting, is also described. The drawings should be consulted.

In the wall of a room is a vertical flue covered by a metal plate; and, at about the middle of the vertical case thus formed, there is inserted a gas burner, with its pipe passing through a hollow bracket. On the top of this bracket is a glass chimney, fitting against it and the bottom of a smoke tube, working in a ball and socket, and passing through the metal plate. This smoke tube is connected to a series of vertical tubes by means of a horizontal chamber, a similar one to which connects their upper ends to a prolongation of the tube which is at last led outside through the wall. The whole main flue can be closed by a hinged double valve, by which any current of air induced up it can be directed into the room through a grating. The hollow bracket through which the air is led to the burner is connected with a tube opening at the bottom part of the room. Below this opening is a double ventilator, one of the connected pair opening into the room, the other at the opposite side of the wall. Their actions being reverse to each other, as one is opened the other is closed, so that a current can be induced up the main flue either from the room or from the outside.

A modification of this arrangement consists in making the main flue horizontal in the ceiling, the gas burner being suspended from its air supply and its up-cast smoke pipes. A flue tube encloses the smoke tube; and a double valve, placed in the ceiling, on being shut, forces the air heated by passing up between the smoke tube and the flue tube to flow into the room; closed, the air passes through a horizontal flue tube outside the room.

A modification of the gas burner is shewn for special use "in " warming and in ventilating without lighting." A tube on which is soldered a copper vase reaching some distance above the burner, is made fast to a ring on the top of the hollow bracket. The smoke tube rests on the top of the glass chimney, itself supported by a shoulder formed in the central tube, encasing the burner, and carrying on its top a piece of wire gauze. By this means the gas is mixed with air from the inlet pipe before passing through the wire gauze.

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1838, June 22.—N° 7698.

JOYCE, Thomas.—" Certain improvements in the mode of " erecting, heating, and ventilating buildings."

[No Specification enrolled. Letters Patent printed, 4*d.*]

A.D. 1838, October 22.—N° 7838.

JEAKES, William.—" A mode of applying ventilating apparatus to stoves." Round the stove is formed a casing into which pure atmospheric air is admitted by a pipe at the bottom, and through which it rises, being heated by contact with the stove, and escapes through an opening in the top of the stove into the apartment. A second casing is fixed at the back of the stove, being intended to receive cold air, or " air rendered heavy by " respiration," and discharge it into an annular passage which surrounds the smoke flue.

[Printed, 6*d.* Drawing. See Repertory of Arts, vol. 17 (*new series*), p. 293; and London Journal (*Newton's*), vol. 14 (*conjoined series*), p. 405.]

A.D. 1838, November 3.—N° 7842.

HEBERT, Luke. — " Certain apparatus and processes for " storing, cleansing, and preserving grain." An apparatus for destroying and removing vermin from grain is described; and also a moveable granary ventilated by a revolving fan, and by its own motion.

Two concentric hollow cylinders have the interval between them divided longitudinally into bins for the corn. They are formed of woodwork, the intervening spaces between which are covered with wire gauze. At each end of the cylindrical granary is a disc formed of a metal frame with light panel doors for admitting a man into the interior of the cylinder. At the centre of one end of the apparatus is a fan which, as it revolves, exhausts the air from the outside through the grain. The entire cylinder rests at both ends and on the middle on friction rollers carried by hydraulic press plungers, communicating with each other, and supplied by a pump with either water or oil. The whole apparatus is slowly turned round by means of a ratchet wheel fixed to the periphery, and in the middle of the length of the cylinder. It has a double row of teeth, and is driven by two pauls carried by anti-friction wheels and receiving an alternating motion from eccentrics fixed on an axis driven by gearing.

[Printed, 1*s.* Drawings.]

A.D. 1839, March 20.—N° 8006.

RUTHVEN, John, and RUTHVEN, Morris West.—

"Ventilating vessels by conveying pipes through them with or
" without stop cocks, so as air may be admitted or forced by
" fanners or otherwise when and where required, and applying
" the same in mines and buildings, the power being applied to
" the axle of the fanners either by a crank handle or pinion."

[Printed, 1*s.* 2*d.* Drawings. See Repertory of Arts, vol. 13 (*new series*), p. 78; Mechanics' Magazine, vol. 32, p. 156; also vol. 40, p. 90; Practical Mechanics' Journal, vol. 3, pp. 71, 88, 110, and 258; also vol. 4, p. 17; and Inventors' Advocate, vol. 1, p. 115.]

A.D. 1840, February 5.—N° 8376.

CARSON, Samuel.—Improvements in apparatus for withdrawing air and vapour from a "chimney or other shaft" by means of currents induced either by the atmosphere or by means of steam.

The upper part of the shaft or chimney is made with bearings to receive the axis of a revolving head within which the draught is produced. On the outside of the shaft is an annular vessel for water, within which turns a tube, fixed to the revolving head in order to make a joint, or the joint may be otherwise made. At a right angle to this tube is another, containing a cone; and, the whole being adjusted to the wind by a vane, the air enters this cone, and induces a draught up the shaft. The revolving head may also be made up of two cylinders of different diameters, the smaller diameter being beyond the cone. Or the ends of the revolving head and of the cone may be turned upwards vertically.

In order to exhaust air by means of steam, a pipe from a chimney, or shaft, or other place is connected with a chamber, itself entering a pipe for carrying away the air. Within this chamber, and extending into it for some distance, is a tube supplied with steam which, as it flows, induces a current of air up the pipe connected with the space out of which the air is to be exhausted.

In another form of apparatus the air is to be exhausted by means of the vacuum produced by the condensation of steam. To the upper part of a shaft, leading from the mine or house, is fitted a valve opening upwards into a chamber connected with a condenser. On allowing steam to flow into the chamber, and then shutting it off by means of a cock on the supply pipe, communication is made with the condenser, and a vacuum then tends to be formed, by which the air is withdrawn from the space in communication with the apparatus.

[Printed, 10*d.* Drawings.]

A.D. 1840, November 10.—Nº 8695.

MECHI, John Joseph.—" Improvements in apparatus to be " applied to lamps in order to carry off heat and the products of " combustion." They relate to oil and gas lamps, and, at the same time, to "ventilating the shop, room, or apartment" in which they are burnt.

The apparatus for carrying off the products of combustion consists of a tube, perferably of sheet iron, placed a short distance above the top edge of the chimney of the burner, and there bell mouthed so as to catch the gases. The tube is to be "of such a " sectional area that there will be about eighteen inches to each " burner." Such tubes are taken into the open air, or, if it be desired to heat apartments with them, they are carried up " on a " continued rise from their lower to the upper ends," to which cowls are fitted adjustable to the wind.

The detailed description and drawing only relate to gas lights.

[Printed, 8*d.* Drawing.]

A.D. 1841, July 13.—Nº 9026.

PHILLIPS, William Henry, and HICKINBOTHAM, David.—A method of ventilating and warming apartments by conducting air from a room or chamber in which a stove is placed through pipes to the several rooms requiring to be heated. The air is discharged through a star formed pipe inserted in the ceiling of the room and the foul air is carried off through a trumpet-shaped tube which passes through the centre of the star-shaped tube. A fan wheel or other appliance may be used to draw off the foul air and to expedite the circulation through the hot air flues.

[Printed, 2*s.* Drawings.]

A.D. 1842, February 8.—Nº 9249.

BIRAM, Benjamin.—Improvements in fans for ventilating mines and other purposes.

The fan is made "with vanes or floats having surfaces of the " curvilinear form or with an obliquity gradually decreasing from

" their axles;" when applied to the ventilation of mines the fan is fixed in the upcast shaft and may be driven by a fall of water directed on vanes fixed at the extremities of the arms in an opposite direction to the vanes by which the air is drawn up; the fan may also be acted on by other means.

[Printed, 10*d*. Drawing. See Mechanics' Magazine, vol. 37, pp. 321 and 366; vol. 40, p. 248; vol. 46, p. 121; and vol. 50, p. 1; and Record of Patent Inventions, vol. 1, p. 13.]

A.D. 1842, February 15.—N° 9259. (* *)

HADEN, George.—" My invention in apparatus for warming " and ventilating buildings consists in the adaptation or application to the external sides of stoves, grates, or other warming " apparatus of certain metallic plates or zig-zag pieces, which, " being cast on to or otherwise fixed to the sides of the stove or " grate, increase the extent and effect of the heating surfaces " and cause currents of air to pass with considerable rapidity " in close contact with these heated surfaces, the air thereby " becoming warmed, and which warmed air may then be conducted to any room or apartment that may require its temperature raised."

[Printed, 6*d*. Drawing. See Repertory of Arts, (*new series*), vol. 18, p. 333; London Journal (*Newton's*), vol. 22 (*conjoined series*), p. 108; Mechanics' Magazine, vol. 37, p. 263; Record of Patent Inventions, vol. 1, p. 7.]

A.D. 1842, February 26.—N° 9270. (* *)

GILLOTT, Benjamin.—" Improvements in heating and ventilating," consisting in driving or drawing air by means of a fan or blower through pipes which pass through the interior of a boiler or furnace and thence to any place where hot air is required.

[Printed, 6*d*. Drawing. See Repertory of Arts, vol. 18 (*new series*), p. 297; Mechanics' Magazine, vol. 37, p. 350; Record of Patent Inventions, vol. 1, p. 62; Engineers and Architects' Journal, vol. 6, p. 427.]

A.D. 1842, July 7.—N° 9413.

VIGERS, William Revell.—(*A communication.*)—Methods " of keeping the air pure in confined places."

The air as it becomes charged with carbonic acid from inhalation or combustion is forced into contact with lime or some other caustic alkali by which the carbonic acid is absorbed; oxygen is also added to the air so purified by being allowed to escape from a receiver in which it had been stored in a compressed state, or it is evolved from some of those salts from which it is usually obtained. Pure air may also be compressed in receivers and allowed to flow from them into places in which the air has become impure.

[Printed, 2*s.* 2*d.* Drawings. See Mechanics' Magazine, vol. 38, p. 143; Record of Patent Inventions, vol. 1, p. 458; Engineers' and Architects' Journal, vol. 6, p. 106; and Artizan, vol. 9, p. 74.]

A.D. 1842, July 9.—N° 9414.

BOOTH, John Peter.—Improvements in ventilating mines.

The ventilation is effected by means of a fan which is used to propel air into or draw it out of the workings; this fan is driven off a perpendicular rod or screw shaft which revolves vertically in the upcast shaft, and is used to raise weights and for other purposes.

[Printed, 10*d.* Drawing. See London Journal (*Newton's*), vol. 23 (*conjoined series*), p. 85; and Record of Patent Inventions, vol. 1, p. 443.]

A.D. 1842, September 3.—N° 9457.

HAZARD, Robert.—" The improvement proposed to be effected " by my invention, is to remove the vitiated air within a carriage " by means of a fanner, which I call a ventilator, fixed at a convenient place, and put in motion by the revolution of the wheel " (or by other motive power)."

[Printed, 6*d.* Drawing. See Repertory of Arts, vol. 1 (*enlarged series*), p. 296; and London Journal (*Newton's*), vol. 22 (*conjoined series*), p. 376.]

A.D. 1843, March 25.—N° 9679. (* *)

FARADAY, Robert.—(*A communication.*)—" Improvements " in ventilating gas burners, and burners for consuming oil, tallow, or other matters." " This invention consists of a means " of ventilating lamp burners, whether they are consuming gas, " oil, or other matters, and consequently whether using wicks or " not, the object being so to arrange the glass chimneys used that " the products obtained by combustion may pass up the inner " glass chimney, and then in place of passing into the atmosphere " of the room or place in which the same is burning, such products of combustion are, by a downward draft, caused to " descend downwards, and be conducted by a suitable tube or

" enclosed passage out of the room or place in which the lamp is " situated."

[Printed, 10*d*. Drawings. See London Journal (*Newton's*), vol. xxiv. (*conjoined series*), p. 99; Mechanics' Magazine, vol. xxxix., p. 271.]

A.D. 1843, June 10.—N° 9770.

TAPPAN, John. — " Certain improvements in apparatus for " grinding and polishing cutlery and other articles, whereby the " deleterious effect on the lungs and health of the workmen pro- " duced by the dust and metallic particles arising from the said " operations are entirely or to a great extent obviated."

[No Specification enrolled. Letters Patent printed, 4*d*.]

A.D. 1843, June 15.—N° 9776.

PAYERNE, Prosper Antoine.—Improvements in purifying air, consisting, firstly, in forcing the air which has become charged with carbonic acid, &c., by respiration or combustion through some substance or solution capable of taking up the carbonic acid, ammonia, and sulphuretted hydrogen. The substances preferred are " the hydrates or oxides of potassium, sodium, barium, stron- " tium, lethium, magnesium, &c." For the conversion of the carburetted hydrogen into carbonic acid and water, electrolysis may be employed; secondly, in adding oxygen to the impure air which may be done by " ferrate of potassium," which will give off its oxygen when placed in contact with water; thirdly, in employing spongy platinum to convert the hydrogen gas set free into water.

[Printed, 1*s*. 4*d*. Drawings. See Mechanics' Magazine, vol. 40, p. 1.]

A.D. 1843, October 18.—N° 9910.

WATSON, William, jun.—Improvements in ventilation.

" Instead of supplying air for the ventilation of buildings from " the level on which such buildings are built, as is commonly the " case, my invention consists in procuring it from an elevation " considerably above them, by means of a high shaft, pipe, or " other tubular column."

The air may be drawn down the pipe by a fan or other means and distributed by pipes in any of the known methods.

[Printed, 6*d*. Drawing. See Repertory of Arts, vol. 3 (*enlarged series*), *p. 203; London* Journal (*Newton's*) vol. 24 (conjoined series), p. 105; and *Mechanics' Magazine*, vol. 40, p. 239.]

A.D. 1844, April 10.—N° 10,139.

MURRAY, JAMES.—Improvements in lighting and ventilating mines, &c., consisting in supplying coal or other gas by means of pipes into the mine, where it can be burned at open or covered burners.

"The gas burning, as above stated, will also have the effect in
" whole or in part of ventilating the mines, by gradually consum-
" ing fire damp, foul air, or other noxious vapours. A current of
" air will also be created, by which the fire damp, foul air, or other
" noxious vapours will be carried off either in whole or in part,
" and replaced by a supply of pure air from the mouth of the
" mine, or from any other communication of the mine with the
" pure atmosphere."

[Printed, 4*d.* No Drawings. See Repertory of Arts, vol. 4 (*enlarged series*), p. 240; and Engineers' and Architects' Journal, vol. 7, p. 423.]

A.D. 1844, April 18.—N° 10,146.

GRANT, DONALD.—Improvements in ventilation, consisting in attaching above the gas burners by which the room to be ventilated is lighted tubes or pipes of earthenware, by which the products of combustion and vitiated air will be carried off and discharged into horizontal pipes laid above the ceiling. The earthenware pipe by which the hot air escapes is surrounded by another pipe into which cold air is admitted for the purpose of keeping the inner pipe cool.

[Printed, 1*s.* 6*d.* Drawings. See London Journal (*Newton's*), vol. 25 (*conjoined series*), p. 397; and Engineers and Architects' Journal, vol. 7, p. 421.]

A.D. 1844, May 7.—N° 10,174.

GRANT, JAMES.—Improvements in ventilating buildings and carriages.

" My invention consists, firstly, in ejecting or emitting a volume
" of steam from a boiler into a chamber pipe or shaft in commu-
" nication with the room or place to be ventilated, whereby the
" vitiated air of the said room or place is drawn into the said
" chamber or shaft, and conveyed away into the external atmo-
" sphere.

" Secondly, in the means of actuating a fan, blower, or other
" exhauster employed for the purpose of exhausting or drawing
" off vitiated or foul air from rooms or places."

The fan or blower is actuated by a second fan attached to the same shaft and moved by the action of the wind to which it is freely exposed. The friction of the revolving fan may be reduced by suspending it to a hollow ball floating in fluid so as to form a bearing.

For ventilating ships, mines, &c. the same method is pursued, the fresh air being supplied and the foul air removed by pipes, and the draught facilitated by steam and fans.

[Printed, 1*s.* 10*d.* Drawings.]

A.D. 1844, May 15.—N° 10,183.

WALKER, William, the younger.—Improvements in warming and ventilating buildings consisting in the construction of a metallic block "or plate having a series of openings passing "through it for the admission and passage of atmospheric air, "which openings present a large surface of metal to the atmo- "sphere in a small space; such perforated block or plate is to be "attached to some heating apparatus, such as a stove containing "fire, a boiler containing hot water, or a pipe containing steam "or hot water, in such a manner as that the heat or caloric from the heating apparatus will pass into such block or plate."

The air, which flows through this block or plate, being warmed thereby, will flow upwards into the building to be ventilated.

[Printed, 10*d.* Drawing. See Repertory of Arts, vol. 5 (*enlarged series*), p. 7; and Artizan, vol. 8, p. 23.]

A.D. 1844, May 25.—N° 10,203.

GUY, William Augustus.—Improvements in ventilation consisting in "inserting into an opening or openings in the wall or "walls, window or windows, door or doors of the building or "apartment or carriage, or in the sides of the ship or boat, "a plate or plates of metal or other suitable material perforated "with a number of holes, and fixed at a little distance behind "and parallel (or nearly so) to the same, a shield or shields of "glass, metal, or other suitable material, so that the air entering "through the perforated metal may be deflected and distributed "by the shield or shields; or instead of ventilating the building "or apartment from the side in manner aforesaid, I effect the "ventilation of the same from the top by means of pipes or vents "carried from the roof downwards."

For ventilating ships a bent syphon-shaped tube is inserted in the side, the longer leg of the syphon opening inwards, and being guarded by a plate projecting over the orifice and attached below it, while a conical valve is fitted in the outer tube to prevent the entrance of sea water, the cone which forms the valve lying loosely in the tube till raised by the water so as to close the pipe.

[Printed, 1*s*. 2*d*. Drawings. See Mechanics' Magazine, vol. 41, p. 385.]

A.D. 1844, July 26.—N° 10,273.

KITE, JAMES.—Improvements in ventilation, consisting in forming apertures in the roof or top of the walls of a building or room, these apertures being covered over with a perforated plate, which is itself covered by a second sliding plate, by which the apertures can be closed or opened at pleasure. The apertures lead either into the chimney or into a separate flue made for the purpose, the top of which is covered with a cowl formed with several loops placed over each other with open spaces between them, or with a revolving cowl of a similar construction. Where it is wished to drive a draft downwards a deflecting plate is placed inside the cowl.

Similar cowls are used for ventilating lamps, lighthouses, &c.

[Printed, 2*s*. 4*d*. Drawings. See Mechanics' Magazine, vol. 42, p. 161.]

A.D. 1844, November 25.—N° 10,402.

BAILLIE, BENJAMIN.—" Improvements in regulating the ven-" tilation of buildings."

" My invention consists of arranging narrow plates of glass as " fixed louvres in suitable frames, to be introduced into window " sashes, and combining therewith sliding or other opening or " closing plates of glass in such manner that when desired the " openings between the fixed glass louvres may be closed or " partly so, so as for the time being to prevent or partially pre-" vent the passage of air, and yet allow of light passing through " the apparatus."

[Printed, 8*d*. Drawing. See London Journal (*Newton's*), vol. 26 (*conjoined series*), p. 391; and Engineers' and Architects' Journal, vol. 8, p. 224.]

A.D. 1845, January 28.—N° 10,501.

LESLIE, JOHN.—Improvements in ventilating apartments in which cooking apparatus is placed.

"In order to ventilate the kitchen or room I cause a long "opening to be made into the chimney, rising from the upper "surface of the boiler to the cornice or ceiling, which opening "may be from two to four inches wide, and it will be found that "by such means there will be a constant passage of the air from "the kitchen or room through such long opening, by which any "impure air will be carried off; and in order that the outgoing "air may not be greater than the case requires for the time being, "I have iron covers, shutters, or slides, which may be curved "to cover such opening to a greater or less extent, and such "covers may be a series of doors, slides, or shutters, one above "the other, hinged to the side of the opening, or they may be "metal plates moving on axes, in the character of louvre board, "so arranged that any of them may be closed, or more or less "open."

[Printed, 10*d.* Drawing. See Repertory of Arts, vol. 6 (*enlarged series*), p. 159; and Patent Journal, vol. 11, p. 10*a*.]

A.D. 1845, June 23.—N° 10,727. (* *)

POOLE, Moses.—(*A communication.*)—"Improvements in ap-"paratus for withdrawing air, gases, and other vapours."

These consist, first, "in withdrawing and forcing away smoke, "gas, and all kinds of noxious vapours," by means of a "cylindric drum," or fan, worked by an arrangement of wheel work with a weight, which should be wound up every twenty-four hours.

Second, consists in placing "over each burner a chimney, con-"structed of two parts; the lower part is bell-mouthed, the upper "is covered, there being openings beneath this covering." Two tubes are connected thereto, "at the ends of which are globes, "into which the products of combustion pass and become con-"densed." The other part of the chimney is a tube, which may be connected to the fan apparatus above referred to, in order to carry off the noxious gases and vapours.

[Printed, 8*d.* Drawing. See Repertory of Arts, vol. vii. (*enlarged series*), p. 97; Mechanics' Magazine, vol. xliv., p. 109.]

A.D. 1845, September 4.—N° 10,827.

HAIG, Alexander.—Improvements in fans for ventilating furnaces, mines, and other places, and for other similar purposes. The fan consists of a cylinder, in which revolves a shaft carrying two or more radial blades; the air enters from two side chambers, through which the shaft passes, through apertures round the axis, and escapes by a pipe which passes downwards from the lower part of the cylinder. The air or gas to be exhausted is admitted by a forked pipe to the two side chambers, and where the fan is employed to exhaust the gases from a furnace air is also admitted to these chambers by a second forked pipe.

[Printed, 10*d*. Drawing. See London Journal (*Newton's*), vol. 29 (*conjoined series*), p. 121.]

A.D. 1845, December 5.—N° 10,981.

BESSEMER, HENRY.—"Improvements in atmospheric propulsion and in apparatus connected therewith, part or parts of which improvements are applicable to the manufacture of columns, pipes, and tubes, and other parts are applicable to the exhausting and impelling of air and other fluids generally." The form of air exhausting or blowing engine described is incidentally stated to be applicable "in the ventilation of mines;" a particular form of rotating fan, to be driven by steam reaction drums, is also described. Fans of the ordinary forms are also specified to be driven in the same way, but the rotating apparatus are not expressly specified as being applicable to ventilation. Both the reciprocating engine and the rotating fan can be used for either exhausting or impelling air.

In its general features, the reciprocating blowing or exhausting engine may be described as a horizontal engine without rotary motion, with both steam and air pistons on the same rod, the cylinders being opposite each other on the same framing. The drawings should be consulted for the details of the steam valve gear, which consists of two D-valves on the same rod, working with expansion slides at their backs in order to obtain variable expansion. The main object in using variable expansion is to adapt the engine to its work which, comparatively slight at the beginning, increases as the air gets more exhausted or compressed respectively, according as the valves of the air cylinder are disposed originally. The engine being more especially intended for exhausting, its variable expansion is regulated by a contrivance which sets them to the degree of exhaustion of the air. This apparatus consists of a ∩-pipe standing in a cistern of water; one leg being connected with the exhaust, the other opening into the cistern. As the rarefaction increases, the water rises in one leg, and in doing so, raises a float balanced by a counterweight in the other leg. This ascension turns the spindle carrying the line on which the float and weight are suspended, and this spindle is connected with a pulley, the revolution of which alters the variable expansion of the steam cylinder. The outside of each end cover of the air pump is fitted with a number of small valves, one half of each set of which at each end open inwards, the other half outwards; the framing carrying the cylinder being made to serve as conducting passages for the air. The steam cylinder covers are protected by an unusual amount of cushioning.

The rotating apparatus consists of a fan shaped like a drum with its circumference formed of perforated plating, and its sides of two discs separated by a number of short radiating arms. The air enters the casing at its centre, and is projected out at the circumference of the drum through its perforations, and thence out at a passage below. A pair of "steam emissive arms," on the same spindle as that of the fan, and supplied with steam through the hollow end, are made to propel the apparatus, the emitted steam being led away below.

[Printed, 2*s*. 2*d*. Drawings.]

A.D. 1846, January 20.—N° 11,046.

BRAITHWAITE, John.—" Certain improvements in heating, " lighting, and ventilating."

[No Specification enrolled. Letters Patent printed, 4*d*.]

A.D. 1846, March 11.—N° 11,127.

STRUVÉ, William Price.— " Improvements in ventilating " mines."

" The object of my invention is to dispense with the furnaces " heretofore used for obtaining the requisite draft, and to use " pumping apparatus of such dimensions as to remove the air " from the upcast shaft in sufficient quantities to ventilate the " mine where such pumping apparatus may be applied. In carrying out this invention all the air, gases, and vapours, ascending " in the upcast shaft pass into the pumping apparatus, and from " thence are ejected into the outer atmosphere, while pure air " enters through the downcast shaft to supply their place."

[Printed, 10*d*. Drawings. See Repertory of Arts, vol. 8 (*enlarged series*), p. 193; Patent Journal, vol. 1, p. 295; and Engineers' and Architects' Journal, vol. 9, p. 321.]

A.D. 1846, May 28.—Nº 11,230.

MARVIN, Richard, and MOORE, William Henry.

"Improvements in gratings of metal or wood for the fronts of "houses and general purposes for the admission of light and for "ventilation." These gratings consist of bars of wood or metal set at an angle in a frame "so that the top of one bar shall cover "the bottom of the next bar," a space being left between the bars for the passage of air.

[Printed, 6*d*. Drawing. See London Journal (*Newton's*), vol. 30 (*conjoined series*), p. 18; Patent Journal, vol. 2, p. 498; and Engineers' and Architects' Journal, vol. 10, p. 88.]

A.D. 1846, August 26.—Nº 11,354.

WROUGHTON, Thomas.—Improvements in regulating ventilation in buildings.

The air is admitted through two sets of parallel slots made in a board or plate, and also through radial slots made in the upper part of the same board; the lower slots are covered by sliding plates also made with slots, and the radial slots are covered by a circular plate with semi-circular openings; all three are connected together by a beam attached to the point on which the plate which covers the radial slot turns, so that they are opened or closed simultaneously; their motion is effected by a float which is actuated by the expansion by heat of spirit enclosed in a tube, so that the air is admitted through the slots when the heat becomes too great.

[Printed, 10*d*. Drawing. See Mechanics' Magazine, vol. 46, p. 337; and Patent Journal, vol. 2, p. 701.]

A.D. 1846, October 15.—Nº 11,415.

KITE, James.—Construction of ventilators with inclined metal surfaces fixed round a cylinder placed on the top of the ventilating flue; these inclined surfaces may be disposed like venetians, in which case they will drive the air down when presented to windward, but will exhaust it when turned to leeward; the cylinder is divided into four parts so as to embrace both methods at the same time; their inner edges may be turned over so as to direct the wind more readily downward; the top of the cylinder may be open and may contain a central pipe up which a blast will be drawn.

[Printed, 1*s*. 4*d*. Drawings. See Mechanics' Magazine, vol, 46, p. 579 and Patent Journal, vol. 2, p. 790.]

A.D. 1846, October 22.—Nº 11,426.

HALE, JAMES LYSANDER.—Improvements in ventilators. The ventilator consists of a pipe in connection with the room to be ventilated; its upper part is made with a number of slots extending all round, and the top is covered by a close plate; around the part in which the slots are cut is fixed a larger pipe in such a manner as to leave a clear space between the two pipes for the passage of air; the wind blows through this space and facilitates the egress of air from the inner pipe.

[Printed, 8*d*. Drawing. See London Journal (*Newton's*), vol. 30 (*conjoined series*), p. 276; Patent Journal, vol. 2, p. 840; and Engineers' and Architects' Journal, vol. 10, p. 181.]

A.D. 1847, January 28.—Nº 11,546.

BRAITHWAITE, JOHN.—Improvements in the ventilation of buildings where gas burners are employed. Above each gas burner is fixed a bell-mouthed pipe, into which the products of combustion enter and pass away through the ceiling and thence below the flooring of the room above to the external air; around this pipe is fitted a larger pipe by which fresh air enters, and being heated by contact with it escapes into the room above by an opening in the floor. The latter opening is regulated by a valve which is connected by a system of levers with the free end of a compound rod formed of metals of different coefficients of expansion, so as to curve and so actuate the levers as the heat rises.

[Printed, 10*d*. Drawing. See Mechanics' Magazine, vol. 47, p. 217.]

A.D. 1847, March 16.—Nº 11,626.

TUCK, JOSEPH HENRY.—Improved apparatus for ventilating, consisting of a flue or chimney top constructed with a number of curved passages projecting downwards and outwards, up which the air will blow and promote a draught in the chimney; the top of the flue is provided with a spiral screw formed of a spiral plate, with the central parts removed.

A revolving head is in some cases fixed to the top a flue, which keeps the wind from blowing down, and has venetians at the lee side to allow of the escape of smoke or air.

[Printed, 8*d*. Drawing. See London Journal (*Newton's*) vol. 32 (*conjoine series*), p. 97.]

A.D. 1847, June 12.—Nº 11,744.

WILCOCK, JOSEPH.—Improvements in ventilating mines, consisting in elongating or raising the upcast shafts by means of stacks, towers, or similar buildings erected above or in connection with such upcast shafts. In some cases the shaft is divided by partitions so as to form separate shafts for the air and for the "drawing;" in other cases the drawing engine placed simply inside the shaft, which is made of such a size "as to allow space "not only for the admission of any machinery and for workmen, "but also for such a quantity of air as will prevent the currents "of air entering through the orifices necessarily left in the sides of "the stack, tower, or building from materially interfering with, "or retarding the upward current of air."

[Printed, 1*s*. Drawing. See London Journal (*Newton's*), vol. 31 (*conjoined series*), p. 406; Patent Journal, vol. 4, p. 76; and Engineers' and Architects' Journal, vol. 11, p. 22.]

A.D. 1848, January 17.—N° 12,027.

GILMORE, JOHN.—Improvements in ventilating ships. Two vertical pipes are fitted in the hatchways, one forward and the other aft; on the tops of these pipes are fitted heads or cowls so as to revolve; one head is directed to windward, and the air is thus blown down it into the interior of the vessel, while the other is directed to leeward and the air escapes through it from below.

[Printed, 10*d*. Drawing. See London Journal (*Newton's*), vol. 32 (*conjoined series*), p. 248; Artizan, vol. 6, p. 105; and Patent Journal, vol. 4, p. 451.]

A.D. 1848, March 8.—N° 12,081.

LOCHHEAD, JAMES.—Improvements in ventilators. The ventilators are formed of glass plates perforated with numerous holes and fitted in an ordinary window frame; the perforated plates are covered by other perforated plates so fitted as to slide over them and open or close, partially or wholly, the apertures; in some cases a glass door or sash is made to shut over the plate.

These plates are formed by a roller which carries a number of teeth on its circumference, and is brought over the sheet of glass while in a fluid state so as to stamp out the perforations.

[Printed, 1*s*. 4*d*. Drawings. See Repertory of Arts, vol. 12 (*enlarged series*), p. 225; London Journal (*Newton's*), vol. 33 (*conjoined series*), p. 92; Patent Journal, vol. 5, p. 108; and Engineers' and Architects' Journal, vol. 11, p. 307.]

A.D. 1848, April 12.—N° 12,121.

MEACOCK, JAMES.—Improvements in ventilating apartments and the cabins of vessels, consisting in "employing perforated

" sheet metal for the cornices of such apartments and cabins, " which perforated metal I cause to be bent or stamped into " forms suitable for cornices, by which the cornices will be " hollow; and make passages or openings from such hollow " cornices into the chimney of the apartment, or into the open " air, or both, using slide or other valves to close or regulate the " passage of air through such openings; and on board ship I " connect such openings by suitable tubes to a chimney or " chimneys rising above the deck of the vessel."

[Printed, 1*s*. Drawings. See Repertory of Arts, vol. 12 (*enlarged series*), p. 309; Artizan, vol. 7, p. 57; and Patent Journal, vol. 6, p. 33.]

A.D. 1848, April 20.—Nº 12,129.

BRITTEN, John.—Improvements in ventilation, "which improvements consist in closing up the fire by a door, and causing the air which passes up the fire-place to be drawn by a " tube from the top of the room, such flue being made to branch " into two parts near the bottom, one part opening above the " fire, so as not to tend much to increase combustion, and the " other (with a regulating slide) opening below or near the fire-place. By this means the combustion can at any time be " checked without stopping the draught up the chimney."

For ventilating carriages the windows are made in two parts opening outwards like doors, and a projecting roof comes over the top of the window and prevents down draught.

[Printed, 8*d*. Drawing. See Artizan, vol. 7, p. 82; Engineers' and Architects' Journal, vol. 11, p. 370; and Patent Journal, vol. 6, p. 51.]

A.D. 1848, December 28.—Nº 12,391.

CHOWNE, William Dingle.—Improvements in ventilating buildings, mines, &c., consisting in conveying away the heated air through a syphon tube, the arms of which project upward, the longer arm forming the external end. In applying this method to rooms the hot air is conveyed by a pipe from the top of the room into the chimney above the fire-place and passes thence upwards.

[Printed, 4*d*. No Drawings. See Repertory of Arts, vol. 14 (*enlarged series*), p. 89; Mechanics' Magazine, vol. 51, p. 16; and Patent Journal, vol. 7, p. 172.]

A.D. 1849, January 11.—Nº 12,414.

BLAKE, Obed.—Improvements in ventilators for houses, ships, vehicles, &c.

For ventilating houses a ventilator is made of glass strips fixed in a wooden frame with spaces between them; a second frame of the same structure slides over this frame so as to open or close the spaces, being supported by springs and a wedge. Perforations are made in the doors and window sashes, and are covered by wire gauze and sliding plates. A ventilator for various purposes may be formed of a number of pieces of glass with bevelled edges made to slide in a wooden frame, and connected together by a system of "lazy-tong" levers, so that they can be brought into contact or separated as desired. For ventilating ships a pipe with telescopic joints, which can be drawn out so as to become of any desired length, is employed. For railway carriages an annular opening is made round the glass of the lamp, which is passed through the roof, and the air being heated by contact with the lamp flows through and escapes outside.

[Printed, 1*s*. Drawings. See Mechanics' Magazine, vol. 51, p. 42.]

A.D. 1849, March 5.—N° 12,504.

DEFRIES, NATHAN, and PETTIT, GEORGE BROOKS.—Improvements in applying the heat of gas to ventilating buildings.

"For this purpose, where gaslights are used, tubes or pipes or " passages are to be employed to carry away the heat from the " room or place in which the light is obtained, up which pipes " the heated currents will flow freely, and by having openings in " such rising pipes air from the apartments or rooms through " which such pipes may pass will flow, and thus ventilate such " places; but this is not claimed separately, this part of the " invention consisting of surrounding such pipes or passages so " heated with gas with water."

[Printed, 6*d*. Drawing. See Repertory of Arts, vol. 14 (*enlarged series*), p. 270; London Journal (*Newton's*), vol. 35 (*conjoined series*), p. 158; Mechanics' Magazine, vol. 51, p. 237; and Patent Journal, vol. 7, p. 261.]

A.D. 1849, March 19.—N° 12,528.

KNOX, GEORGE.—Improvements in railway carriage ventilators. The ventilator which is placed above the door consists of a fixed plate with a number of horizontal slots cut through it, and of a second sliding plate with similar slots, which can be raised or lowered so as to open or cover the slots in the fixed plate; it is raised by a wedge which slides under it, and is actuated by a button attached to its inner side.

[Printed, 2*s*. 4*d*. Drawings. See Repertory of Arts, vol. 14 (*enlarged series*), p. 337; Mechanics' Magazine, vol. 51, p. 286; and Patent Journal, vol. 7, p. 259.]

A.D. 1849, April 4.—N° 12,580.

GORDON, Robert.—Improvements in the ventilation of mines. Instead of the air in the upcast shaft being drawn through a furnace in the shaft itself, it is passed from the top of the shaft into a horizontal culvert, from whence it issues through the ash-pit and bars of a number of boiler furnaces into a lofty chimney which is erected between them; an opening is also made so that the air can be passed wholly or partially into the chimney above the furnaces instead of through them.

[Printed, 10*d*. Drawing. See Repertory of Arts, vol. 14 (*enlarged series*), p. 277; London Journal (*Newton's*), vol. 35 (*conjoined series*), p. 266; Mechanics' Magazine, vol. 51, p. 335; Patent Journal, vol. 8, p. 58; and Engineers' and Architects' Journal, vol. 12, p. 372.]

A.D. 1849, June 5.—N° 12,636.

BOVILL, George Hinton.—"Improvements in manufacturing "wheat and other grain into meal and flour." The ordinary process of grinding grain is well known to be attended with the diffusion amongst the surrounding air of a fine dust termed "stive," and this action is found to be intensified when air is blown in between the grinding surfaces of the millstones, as specified by several inventors, besides the present one, previous to 1849. In the original Specification there is claimed "making the bed-stove rotate instead of the top one," "and "causing currents of air, either by exhaustion or pressure, to "pass between the grinding surfaces of mill stones when the top "stone is so fixed." For this purpose, an air-tight covering is placed on the eye of the stone, through which the feed tube works, and on which is fitted the tube for the blast of air from the blowing machine. Air pipes are also made in the top of the stone, opening into furrows on its face and leading back to the eye for the supply of the air.

In 1855, the inventor disclaimed "making the bed or under "stone rotate."

In order "when working mill stones with a blast of air" "to "carry off all the warm dusty air blown through between the

" stones to a chamber" a pipe, "from a fan or other exhausting " machine" is fixed on the mill stone case covering the stones, " or other closed chamber receiving the meal." By this means " the dust in the meal is avoided." This stive is then blown " into a chamber having its sides and top formed of one or more " thicknesses of suitable porous fabrics," in order to filter the air from the fine flour. The filtering chamber can also be placed " between the stone case or chamber receiving the meal and dust " from the stones, and the exhausting machine;" the stive being " then sucked through the filtering fabrics."

By numerous legal decisions, this Specification has also been construed as covering the use of an exhaust fan applied to the millstone case of an ordinary pair of stones without the top stone being fixed; with or without any covering or hat at the eye; with or without any artificial blast between the grinding surfaces; and with or without any stive room.

On the 1st May 1855 a Disclaimer and Memorandum of Alteration was filed by the patentee.

[Printed with Disclaimer, 8*d*. Drawing.]

A.D. 1849, August 1.—Nº 12,730.

MURDOCH, JAMES.—Improvements in ventilating ships. "A " perforated pipe laid along under the lower deck of the vessel, " communicates with an upright pipe which rises above the upper " deck, and is open to the atmosphere, and a perforated pipe lying " immediately under the upper deck, communicates with the " discharge pipe. The foul air is thus withdrawn from the upper " part of the vessel and the external air makes in through the " pipes to supply its place." The current of air so produced is " directed over the surface of salt water heated in a boiler so as to " promote its evaporation.

[Printed, 10*d*. Drawings. See Mechanics' Magazine, vol. 52, p. 115; and Patent Journal, vol. 8, p. 259.]

A.D. 1850, January 19.—Nº 12,935.

BEADON, WILLIAM, junior.—"Improvements in conveying " away or decomposing smoke and products of combustion from " stoves or grates, and in ventilating rooms of residences."

[No Specification enrolled. Letters Patent printed, 4*d*.]

A.D. 1850, March 11.—Nº 13,003.

WILKINS, William Crane.—Improvements in ventilating apartments.

At the top of the room an opening is made into the chimney, in this opening a fan or wheel is fixed on horizontal axes in such manner that it can only move in one direction and allow the hot air to pass into the chimney as it revolves, while the smoke from the chimney cannot pass in the opposite direction.

A second form of ventilator consists in a number of glass strips jointed by their ends into a frame and connected by parallel levers, so that they can be closed or opened like the rods of a venetian blind. Two glass plates only may be employed, and may be made to open in opposite instead of parallel directions.

[Printed, 3*s.* 2*d.* Drawings. See Mechanics' Magazine, vol. 53, p. 238; and Patent Journal, vol. 9, p. 285.]

A.D. 1850, March 23.—Nº 13,015.

CARTER, Horatio.—Improvements in applying the heat of gas burners to ventilation.

The gas burner is supplied with a chimney by which the products of combustion pass off; this chimney is in communication with a pipe by which the products of combustion and also the hot air of the room are conveyed away to the external air. This pipe may be surrounded by a second and larger pipe in such a manner that an annular space will be left between them through which the air of the room will pass, being heated by contact with the inner pipe.

[Printed, 1*s.* 2*d.* Drawings. See Mechanics' Magazine, vol. 53, p. 256; and vol. 1 (*new series*), p. 400; and Patent Journal, vol. 10, p. 53.]

A.D. 1850, March 23.—Nº 13,017.

WILSON, Alfred.—Improvements in ventilators.

" My invention has reference to that description of ventilator " which is composed of a series of flat strips or pieces of glass, " metal, wood, or other suitable material, placed over each other " in the manner of what are ordinarily known as loover or luffer " boards, and which is provided with the means of altering the " angle at which the several loovers are placed, so as to regulate " or entirely close the passage for air; and consists in so constructing ventilators of the class above-mentioned, that the " *several loovers* may be actuated by a series of levers whose

" fulcra or centres of motion are placed between the weight and " the power, and so as to cause the several loovers to open out of " or away from the frame in which they work."

[Printed, 1*s*. Drawing. See London Journal (*Newton's*), vol. 37 (*conjoined series*), p. 231; Mechanics' Magazine, vol. 53, p. 257; and Patent Journal, vol. 9, p. 297.]

A.D. 1850, May 22.—Nº 13,075.

NEWTON, William Edward.—(*A communication.*)—Improvements in warming and ventilating apartments.

" By means of a pipe or tube placed in the chimney shaft, one " end of which tube communicates with the atmosphere of the " upper part of the room, while the other end terminates in a close " chamber or air space contiguous to the fire-place, whereby either " warm air may be passed through the apparatus into the upper " part of the room, or the hot and vitiated air may be drawn off " from that part and passed up the chimney."

[Printed, 10*d*. Drawing. See London Journal (*Newton's*), vol. 41 (*conjoined series*), p. 253; Mechanics' Magazine, vol. 53, p. 436; and Patent Journal, vol. 10, p. 117.]

A.D. 1850, August 22.—Nº 13,234.

NEWTON, William Edward. —(*A communication.*)— " Im-" provements in machinery or apparatus for producing ice, and " for general refrigeratory purposes." The machine here described acts by means of the alternate compression and expansion of atmospheric air, and is primarily intended to be used for making ice, but it is stated that " with slight and obvious variations in " the minor details it is applicable to other purposes; as, for " example, to the cooling of the atmosphere of buildings, of " steam and other vessels;" and " the maintenance of a low " temperature in buildings in which particular branches of " manufacture are carried on;" and for cooling brewers' worts.

The air is first compressed in a double-acting compression pump, the heat developed being taken up by injecting water, by means of a smaller double-acting pump, alternately into each end of the cylinder, and through rose-heads, in the form of fine spray. Each end of the cylinder alternately communicates with a vertical reservoir, opening by a pipe placed somewhat above its bottom into the horizontal main air receiver, whence the compressed air *makes its way into the* expanding cylinder.

The engine in which the air is expanded consists of a cylinder, bushed with brass, and with valves actuated by gear from the main shaft, in such wise as to cut the compressed air off at a certain portion of the stroke. Instead of water, brine or alcohol, or other liquid uncongealable at the freezing point of water, is injected in a fine spray, by means of a double-acting pump, alternately at each end of the cylinder. The air, in expanding, abstracts the heat of this liquid which, on being led past boxes containing water, cools and gradually freezes it, as the temperature of the liquid gets further lowered by being repeatedly re-injected into the cylinder.

The compression pump for the air, and the engine for expanding it, are connected together, so that as the air expands against the moving piston a portion of the work expended in compressing the air is returned to the prime mover. Similarly as with the freezing liquid, the same air is used over again, being returned after complete expansion to the compression pump.

In making ice, both the expanded air and the cooled liquid are conducted into the "refrigerating room," which is a closed chamber divided by partitions into a large central chamber and a series of smaller ones, which latter communicate with each other. These chambers or partitions are for receiving the vessels containing the water to be frozen, the freezing liquid being allowed to gradually rise up the intermediate space. The water vessels may also be erected on wheels, so that they can be introduced at one end of the series of refrigerating chambers, causing them to pass successively towards that end at which the cooling liquid enters.

[Printed, 1*s*. 8*d*. Drawings.]

A.D. 1850, October 24.—Nº 13,293.

PASCAL, Jean Louis.—Improvements in ventilating rooms and chimneys.

"This apparatus consists of an outer tube or case placed over " or around the tube within which the smoke ascends, or by " which the room is to be ventilated. Between this inner and " outer tube, at the lower part of the latter, are placed certain in- " clined and curved plates or pieces of metal connecting the two " tubes together, and arranged so that the wind or current of " external air striking upon them will be reflected, and cause an " upward current between the two tubes. Above the inner tube " *is placed a fan* capable of revolving about an axis, and with

" three or four plates or vanes arranged in such manner as that " the ascending current of rarified or heated air, or the current " pushed between the external and internal tubes, or the two " currents combined, may cause the fan to rotate about its axis, " and act as an exhauster, and thus improve the draft of a chimney " above which it may be placed, or ventilate any apartment or " place into which the inner tube may lead."

[Printed, 6*d*. Drawing. See Mechanics' Magazine, vol. 54, p. 137; and Patent Journal, vol. 10. p. 122.]

A.D. 1850, November 25.—N° 13,365.

HAMILTON, John, and WEEMS, John.

" Our improvements in warming and ventilating buildings and " structures consist in forcing into them, by a fan or other " mechanical means, fresh air, causing the same to pass over " heated surfaces in its progress to the buildings or structures in " order to obtain the degree of temperature required." The heating surfaces are warmed by steam, and the air is passed over them backwards and forwards till the desired temperature is attained; provision is made for the escape of the heated air from the upper part of the rooms to which the hot air is supplied.

[Printed, 1*s*. Drawings. See Mechanics' Magazine, vol. 54, p. 437; Practical Mechanics' Journal, vol. 5, p. 80; and Patent Journal, vol. 11, p. 99.]

A.D. 1851, January 16.—N° 13,458.

COGAN, Robert.—Improvement in ventilation.

" It consists of an inclined frame which is glazed like a window " sash where it is fixed in an inclined position the sides and roof " being also glazed, leaving however a long opening or space " along the top part to allow the vitiated air to escape from the " room." This ventilator is of the hopper shape, but instead of being open at the top it is covered, with the exception of the narrow opening at the back; the air enters through an opening in the outer part at the bottom.

[Printed, 8*d*. Drawing. See London Journal (*Newton's*), vol. 41 (*conjoined series*), p. 24; Mechanics' Magazine, vol. 55, p. 77; and Patent Journal, vol. 11, p. 197.]

A.D. 1851, April 24.—N° 13,599.

SMITH, William, and PHILLIPS, Thomas.—Improvements *in ventilating buildings*. In the centre of the ceiling of each room is fixed a funnel-mouthed pipe which passes off laterally till it enters a large pipe which passes up the side wall of the house, and which serves to carry off the smoke from a stove which is placed in the basement, and which serves to heat air, which is conveyed by pipes to the different rooms.

[Printed, 1*s*. Drawings. See Mechanics' Magazine, vol. 55, p. 359; Patent Journal, vol. 12, p. 62; and Journal of Gas Lighting, vol. 2, p. 226.]

A.D. 1851, May 7.—N° 13,624.

MELLISH, Thomas Robert.—Improvements in ventilators. The ventilators which are made to take the place of window blinds are formed of glass rods or strips fixed in a frame, so that they can be made to revolve each on an axis of its own; part of two opposite surfaces of each rod is notched or cut away so that in one position of the rods there will be open spaces left between them for the admission of air; the rods are sometimes attached in pairs to short bars which can be turned so as to open a space between each adjacent pair of rods; the rods are sometimes fixed in a frame so that they can be slid or rolled to one side. Ceiling ventilators are formed in the same manner.

[Printed, 8*d*. Drawing. See Mechanics' Magazine, vol. 55, p. 415; and Patent Journal, vol. 12, p. 87.]

A.D. 1851, October 23.—N° 13,785.

HENDERSON, Donald.—Improvements in ventilators. The ventilator which is made to fit in the centre of the ceiling of the apartment consists of a circular pipe open at top and bottom and surrounded by a larger conical pipe, in the lower part of which is fitted an annular gas burner; the top of the annular space is closed, but there are a number of openings at the bottom for the supply of air to the burner, and other openings in its inner surface to allow the products of combustion to pass into the inner pipe; the air of the room flows up the central pipe.

[Printed, 1*s*. 4*d*. Drawings. See Mechanics' Magazine, vol. 56, p. 358; Engineers' and Architects' Journal, vol. 15, p. 144; and Journal of Gas Lighting, vol. 2, p. 336.]

A.D. 1851, December 19.—N° 13,863.

POOLE, Moses.—Improvements in ventilating railway carriages. On the roof of the carriage is fixed a pipe with a T-shaped head, of which the arms project forward and back; that arm which is forward catches the wind and drives it through the pipe into the carriage, a valve preventing its escaping into the other arm. Gauze diaphragms are fixed in the pipe to prevent dust and to distribute the air. A water cistern is sometimes introduced to catch sparks, &c. Side openings are made in the carriage for the escape of the air, and are guarded from the wind outside by wooden flaps or windows.

[Printed, 8*d*. Drawing. See Repertory of Arts, vol. 20 (*enlarged series*), p. 101; Mechanics' Magazine, vol. 56, p. 516.]

A.D. 1852, January 27.—Nº 13,929.

DIX, ALEXANDER MILLS.—"Certain improvements in the " method of ventilating apartments or buildings, and in the " apparatus connected therewith."

[No Specification enrolled. Letters Patent printed, 4*d*.]

A.D. 1852, April 17.—Nº 14,071.

DUPRÉ, WILLIAM HENRY, and LE SUEUR, CLEMENT.—Improvements in ventilating chimneys and buildings. The top of the chimney is made of the shape of the frustrum of a cone, and round the top of the cone is fixed a second frustrum of a cone open above and below, and extending above and below the top of the inner cone. Above the outer frustrum is fixed a close cone, round the outside of which are fixed a number of spiral plates which cause the wind to pass down into the outer frustrum and carry the smoke out of its lower end. The same apparatus is useful for ventilation generally. For ventilating apartments a door or valve is employed which opens downwards, and is held by balanced weights; it may be glazed with glass.

[Printed, 8*d*. Drawing. See London Journal (*Newton's*), vol. 42 (*conjoined series*), p. 106; Mechanics' Magazine, vol. 57, p. 337; and Engineers' and Architects' Journal, vol. 15, p. 395.]

A.D. 1852, May 22.—Nº 14,130.

ROBERTS, RICHARD.—Improvements in ventilating ships and buildings.

"My improved system of ventilating apartments consist in the " application of perforated hollow beams intersected by trunk " pipes, terminating in a lofty air pipe, for which purpose, on " board a sailing vessel, the mast may be made hollow and " furnished with openings near the top. In steam vessels, I

" propose to surround the chimney by a casting divided into " compartments. Each of these compartments is in connection " with the main trunk and system of hollow beams for venti- " lating a certain portion of the vessel. Should the heat of the " chimney fail to produce sufficient rarefaction in any particular " compartment, the draught is increased by turning a jet of " steam up it."

[Printed, 3*s.* 2*d.* Drawings. See Mechanics' Magazine, vol. 57, p. 437.]

A.D. 1852, June 1.—N° 14,150.

NEWTON, ALFRED VINCENT.—(*A communication.*)—Improvements in ventilation of the engine rooms of marine caloric engines, consisting "in a mode of supplying air to the said " engine room through trunks which extend from the top to " near the bottom of the said engine room or apartment, and " with a discharge pipe which connects with the exhaust of the " engine or engines for the discharge of the air or other gas."

[Printed, 10*d.* Drawing. See London Journal (*Newton's*), vol. 42 (*conjoined series*), p. 194; and Mechanics' Magazine, vol. 57, p. 477.]

A.D. 1852, June 8.—N° 14,160.

RETTIE, WILLIAM.—Improvements in ventilators.

"In carrying out this invention, I set slips or pieces of glass " radially in two circular metal or other frames, having radial " slots or openings, within every alternate one of which I insert " a filling of plain, colored, or ground glass. These two frames " are mounted on a common centre, and when the ventilator is " closed a continuous surface of glass and metal is presented, " but when opened the glass of one frame is brought over the " glass of the other, and thus an open space equal to the trans- " parent surface is presented."

The ventilator is kept closed by a spiral spring. For the purpose of drawing off the foul air from cooking stoves or hot plates, a head or cover is placed over them which communicates by a pipe with the chimney at the back.

[Printed, 8*d.* Drawing. See Mechanics' Magazine, vol. 57, p. 495; and Journal of Gas Lighting, vol. 3, p. 30.]

A.D. 1852, July 15.—N° 14,220.

BOVILL, GEORGE HINTON.—" Improvements in manufacturing " wheat and other grain into meal and flour." They relate to driving millstones by bands from a central horizontal shaft; to drying flour and meal by steam, or hot air cylinders; to treating flour by steam, in order to restore moisture to it; to washing and then drying corn by currents of air, and to two modes of aerating millstones by which the fine flour or stive is, at the same time, prevented from diffusing itself throughout the atmosphere of the mill.

The process for washing wheat and then drying it by air currents consists in supplying the grain into a cylinder filled with water, which can flow over at an annular grating surrounding the cylinder. Within the cylinder revolves a vertical spindle, fitted with blades, which stir up the wheat, the light grains and impurities flowing over the edge of the cylinder and out at the annular grating. When the wheat is thus washed, a slide at bottom is opened, and the contents allowed to fall out of a shoot on a screen, and thence into the "dryer." This is formed of another cylinder of open framework covered with wirework or perforated plate, and containing a spindle fitted with blades. As they revolve, they cause a current of air through the cylinder, and evaporate the moisture on the grain. The cylinder may either be made a fixture or to revolve.

With a pair of mill stones, the bed stone of which is fitted with segments of perforated plate or wire gauze placed level with the grinding surfaces, and "employed to take out the flour from " between the stones in the process of grinding;" "currents of " air, produced either by blowing or exhausting machinery, and " either separately or in combination," "are made to pass between " the grinding surfaces," and down through the perforations in the stone.

When ventilating horns or similar instruments are applied to mill stones, "exhausting machinery" is employed in combination with them.

[Printed, 1*s*. Drawings.]

PATENT LAW AMENDMENT ACT, 1852.

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A.D. 1852, October 2.—N° 183.

GREEN, Thomas, junior.—(*Provisional protection only.*)—" Improvements in the construction of omnibuses." "A recess is " made in the roof from end to end to allow of passengers walking upright," and the cornices at its sides act as hand rails. In the sides and ends of the recess are set ventilators. The particulars of these ventilators are not given, but they appear to consist of wire-work. The windows are fixtures, "the frame of " the omnibus being filled in with glass." Other improvements for rendering omnibuses more commodious, and for enabling them "to be worked with greater ease," are described.

[Printed, 6*d*. Drawing.]

A.D. 1852, October 4.—N° 200. (* *)

WELCH, Edward. — (*Provisional protection only.*) — 1. "A " syphon register grate," in which the smoke is conveyed " downwards all round the fire in a syphon tube," thereby greatly increasing the heat of the fire. "At the top of the syphon a " register is fixed, by means of which the smoke can be taken " directly up the chimney when the heat is not required."

The heat may be conveyed in a similar manner to a separate room.

2. A wind-guard to prevent the smoke being driven down the chimney, consisting of a hemispherical dome above the chimney-pot with a hole in its top; a bent plate, with or without a hole, is fixed above this.

3. An oven over the top of the fire, inclosed in an iron box, through which the hot air passes.

[Printed, 6*d*. Drawing.]

A.D. 1852, October 6.—N° 268.

CROSSBY, William.—(*Provisional protection only.*)—" Improvements in the ventilation of coal pits and mines, ships,

" rooms, and buildings generally," consisting in drawing the air from the place to be ventilated, or forcing fresh air into it by means of a fan communicating with the place by pipes. The same fan may be used for injecting and exhausting air alternately, or two fans may be used simultaneously.

[Printed, 4*d*. No Drawings.]

A.D. 1852, October 6.—Nº 278.

ADOLPH, William.—Improvements in ventilating and warming apartments consisting in surrounding the stove by which the room is heated with an air chamber into which the air enters through perforations at the bottom and escapes in a heated state above. Where this system is adapted to fire-places already constructed, a passage is made in the brickwork behind the fire and the air flows through it in the same manner. Where large buildings are to be ventilated, the air is supplied to the chamber by a pipe entering the building from outside.

[Printed, 8*d*. Drawing.]

A.D. 1852, October 9.—Nº 319.

JOHNSON, James.—" An improved method of ventilating cot-
" tages or dwelling houses, which I accomplish by leaving cavities
" or recesses at certain distances within or between the walls
" extending from the top to the bottom thereof, with perforated
" plates inserted in the walls of each room to communicate with
" the said cavities. I also make these cavities or recesses com-
" municate with common flues, by which a draught or strong
" current of air is obtained sufficient to ventilate any room or
" building, however extensive.

These common flues are made to carry off the smoke from a number of different buildings to one common chimney.

[Printed, 6*d*. Drawing.]

A.D. 1852, October 11.—Nº 338.

LAMBERT, Robert.—" This invention has for its object the
" applying means of ventilation to the upper parts of tents, and
" also the construction of double tents for hot climates; and
" consists, first, of constructing the upper parts of a tent with
" net or other work for the passage away of air from within com-
" bined with a cover to close such open work when desired, and
" *also with a head to* throw off rain, and yet retain the open work

" for ventilation; secondly, the invention consists of combining " two tents, each with means of ventilation, so that there will be " a space between them, by which the interior tent will be less " acted on by the sun than when a single tent is used."

[Printed, 8*d*. Drawing.]

A.D. 1852, October 12.—N° 346.

PERKES, Samuel.—Improvements in ventilating mines and buildings.

1st. For the ventilation of mines, pipes are laid in the mines adapted for conducting the foul air and gases generated to the mouth of the mine where the pipes are heated so as to promote a draught, or the gases are discharged into the furnace.

2nd. For the ventilation of buildings, pipes "bell or funnel-" mouthed or otherwise," are fixed around the walls and at the ceilings, and carry off the air from each apartment to main pipes from which they pass to large common chimneys.

[Printed, 8*d*. No Drawings.]

A.D. 1852, October 12.—N° 356.

ROBINSON, Joseph.—Improvements in ventilators.

"My invention consists in mounting two sets of louvre boards " in a frame in such manner that one set shall remain stationary " while the other is free to slide to and fro at the back of the " fixed set. The object being to admit air without allowing a " person from without seeing into the apartment or chamber " where the ventilator is fitted, and at the same time to regulate " the air admitted."

[Printed, 8*d*. Drawings.]

A.D. 1852, October 13.—N° 371.

McFARLANE, Walter.—Improvements in ventilating public waterclosets, consisting in "forming the same with clear open tops " above the seats, in connection with perforated upper sides for " the passage through of air."

[Printed, 1*s*. Drawings.]

A.D. 1852, October 20.—No. 451.

BROWN, Robert.—Improvements in ventilating buildings in which gas burners are employed. The gas burners are placed at the upper part of the room, within glass funnels, communicating with pipes which pass off through the ceiling to the outside of the building.

"The ascending current of heated air caused by the burning " of the gas or other artificial light will constantly draw off the " upper stratum of air, or that next the ceiling of the building or " apartment, which will of necessity be the most foul and vitiated, " causing it to pass through the gas or other light, and thence " by means of the flue or pipe to the external atmosphere."

[Printed, 8*d*. Drawings.]

A.D. 1852, October 23.—N° 509.

WATSON, Charles.—"This invention consists of an apparatus " to be used through the ceiling or roof, or deck of a " vessel, of a building or apartment leading from the interior " into the open air. The apparatus is of a conical form at its " lower part, and is either open or has a radical or ornamental " grating over it. The upper part consists of a cylinder, having " at the top a hood of a conical form affixed by several straps; " and for the purpose of ornament, and to give stiffness to the " lower part of the conical hood, there is a vandyke or plain " border affixed. The interior of the apparatus is divided by a " vertical partition, and there is a horizontal partition near the " lower part of the apparatus, having therein two openings closed " by valves, which by means of cords or chains, in guide pulleys, " may be opened at any convenient position of the building."

[Printed, 6*d*. Drawing.]

A.D. 1852, November 2.—N° 612.

DIBLE, James.—"My invention consists in the application " of pipes or chambers to any part of either steam or sailing " vessels for the supply of pure and fresh air in combination " with other pipes and chambers for carrying away the impure " and foul air. My invention is also applicable for supplying " warm and heated air to the interior of vessels through such " pipes or chambers, and for extinguishing fires on board by " admitting water through the same pipes or chambers as are " used for the supply of air."

[Printed, 8d. Drawing.]

A.D. 1852, November 4.—N° 637.

POPE, William.—" Improvements in ventilating ships.

" At the head and stern of the vessel I provide a series of air
" conductors, and I bring into connection therewith a system of
" pipes, which traverse the vessel in any convenient way, and
" give off the air supplied to them whenever it is required. Thus,
" for example, in ventilating a passenger ship, I fit in the floor of
" each sleeping cabin a metallic or other box, having a lid pierced
" with numerous holes, or covered with a grating, and I connect
" this box with the system of ventilating pipes."

[Printed, 1*s*. Drawings.]

A.D. 1852, November 11.—N° 714.

HUART, Henry.—Improvements in ventilating buildings and receptacles used for preserving grain. The grain is contained in wooden receptacles, which are placed vertically side by side in the building, with open spaces between them, through which the air flows freely, and keep the grain cool. At the bottom of each receptacle is a conical opening, through which the grain flows and from whence it is raised by screws to the top of the building and returned to the receptacle at the top.

[Printed, 1*s*. Drawings.]

A.D. 1852, November 24.—N° 848.

FINLAYSON, Charles.—" Improvements in apparatus for
" heating, drying, and ventilating."

" My invention refers to apparatus in which currents of air are
" propelled by means of a blowing apparatus through tubes or
" other channels, heated by steam or other means, the peculiar
" feature of my invention consisting in the employment of a
" steam engine, which constitutes a part of the heating apparatus,
" such steam engine being used for driving the fan or other
" blower, and the exhaust steam therefrom being used (if desired)
" as the heating medium."

[Printed, 6*d*. Drawing.]

A.D. 1852, December 10.—N° 1015.

SHERINGHAM, John.—Improvements in ventilating rooms. At the back and sides of the grate or stove by which the room is heated is formed a chamber, to which air is admitted below, and being heated by the fire escapes at the upper part into the room. When the fire is not lighted a gas jet may be placed in the air chamber, which in that case will be used to draw up the air from the room and discharge it into the chimney.

[Printed, 1*s.* Drawings.]

A.D. 1852, December 11.—N° 1024.

HOWELL, George Duncan.—(*Provisional protection only.*)—“ Improvements in ventilation,” consisting in applying “ to pipes “ or hose used for the purposes of ventilation a peculiarly bent “ tube or syphon.”

“ This tube or syphon is so formed and arranged as to be capable “ of receiving a current or blast of air into the descending leg of “ the syphon, and delivering it out at the mouth of the ascend-“ ing leg of the same into the chimney, pipe, or hose in which “ the vent tube or syphon may be fixed. By this means a partial “ vacuum is caused near the outlet of the bent tube or syphon, “ and the rush of air to fill the same produces the required “ ventilation.”

[Printed, 4*d.* No Drawings.]

A.D. 1852, December 17.—N° 1092.

BILLINGS, Robert William.—(*Provisional protection only.*)—“ Improved apparatus for ventilating chimnies and apartments.”

“ It consists (by preference) of a rectangular casing or shaft, “ which is closed at top, but is open at bottom and at two oppo-“ site sides, and is inserted in the chimney to a given depth, so “ as to form a continuation of that flue. The depth of the “ insertion I propose to determine by the position at which I “ place two pairs of rigid wings composed of plates, which pro-“ ject from opposite sides of the rectangular casing, for the “ purpose of acting as wind guards for the flue vents, which are “ formed in the sides at the part shielded by the guards. I con-“ struct the space within the casing by the insertion of two “ diagonal partitions rising from the lower edge of the vents, and “ respectively secured to or forming part of the sides of the “ casing. These partitions fall towards each other, and they “ terminate near the crown or top of the casing, thereby forming “ a central flue for the passage upwards of the smoke and gases

" of combustion; and two side flues, down which the smoke or " gases pass, to make their exit at the side vents."

[Printed, 4*d*. No Drawings.]

A.D. 1852, December 24.—Nº 1162.

WILSON, James Godfrey.—(*Provisional protection only*.)—" Constructing the roofs of carriages and vehicles to be used " on railroads or ordinary roads, that the ventilation is thereby " improved. This I propose to effect by having the outer covering " of the roof and the inner roof or lining placed a distance apart, " or so constructed that a free space (so far as practicable) is left " between them.

" I propose to admit a free circulation of air through the space " so formed between the inner and outer roof by openings in the " back, front, or sides of the carriage, in connection with the " said space. By means of fine perforations or openings under " regulation in the inner roof or lining, free admission and " emission of air may be given.

[Printed, 4*d*. No Drawings.]

A.D. 1852, December 24.—Nº 1166.

NESMOND, Pierre Charles.—" Improvements in machinery " applicable to the manufacture of ice and to refrigerative purposes " generally." The process employed is that of compressing air to a considerable pressure, and then allowing it to expand in contact with the objects to be cooled. Little or no work is to be done by the air during its expansion; but it is not to be " permitted to pass too quickly over the surface of or in contact with " the substances to be refrigerated;" its speed is regulated, " thereby obliging it to remain a sufficient time in contact " " to " cause it to abstract the caloric."

The drawings shew, erected on the same foundation plate, a common force pump for compressing the air into a receiver, where it is to be cooled by a volume of water which lies on its top. The air-receiver is clothed with some non-conducting substance. It communicates, by means of two connected taps, with another vessel, divided horizontally into two parts; the lower portion forming the " dilatation chamber," the upper " the refrigerator." They communicate by means of a tube, which, in one instance, opens into the bottom of a vessel filled with liquid to be cooled;

in another, just above a valve at the top of the outer casing of the vessel filled with liquid, which casing is made with a spiral partition for the passage downwards of the air to a central pipe led up the liquid. The inventor appears to rely mainly on the retarding action of the two taps, between which is a small spherical receiver, for obtaining the cooling action.

A great number of manufacturing operations are mentioned in which such an apparatus can be employed. The mode in which he proposes to use it for cooling apartments and "theatres, ball-" rooms, butchers' markets, the medical amphitheatres, hos-" pitals," is to "inject the currents of cold air direct into them" through the two taps leading from the receiver to the dilatation chamber.

[Printed, 8*d*. Drawing.]

A.D. 1852, December 27.—Nº 1167.

ANDERSON, John.—"Improvements in warming and ventilating " apartments." An air chamber is formed below the grate by which the room is heated. "This chamber is supplied with air by a " tube communicating with the external air. As the air in the " apartment ascends the chimney the external air enters the " chamber under the grate through the tubes, and being heated " passes into chambers formed at the back of the fire. From " the latter chamber the air enters the apartment through ven-" tilators placed in the cheeks or sides of the fire-place, thus " causing a constant supply of rarified air in the apartment."

[Printed, 6*d*. Drawing.]

1853.

A.D. 1853, January 6.—Nº 42.

WARD, William Sykes.—"A thermostat or apparatus for " the regulation of temperature and of ventilation." This thermostat consists of a vessel or series of vessels filled with sulphuric ether or other volatile fluid, the ends of which are formed of thin elastic discs of metal which bend under the joint forces of the ether inside and the air outside, and being connected by means of levers with the valve of the ventilator close it wholly or partially as the temperature falls and cold air is no longer required, or vice versâ.

[Printed, 6*d*. Drawing.]

A.D. 1853, January 7.—N° 51.

MARSHALL, Hezekiah.—Improvements in ventilation consisting in the "admission of the air at the floor, or as low as con-" venient; its transmission from the various parts of the interior " space to one common chamber above the ceiling; and its emis-" sion or exit through a passage or passages at a higher elevation " than the said chamber." The drawing should be consulted.

[Printed, 6*d*. Drawing.]

A.D. 1853, January 15.—N° 106.

VION, Hippolyte Charles.—"Improvements in apparatus " for refrigerating." In the Provisional Specification of this invention for abstracting heat by the evaporation of liquids, no mention is made of its application to ventilation; amongst the numerous applications noted in the final Specification for manufacturing and other operations, it is recommended "for changing " the atmosphere of houses in hot regions, and for all kinds of " culinary preparations." But the mode of application is not indicated; it can only be assumed that the inventor had a notion of using blocks of ice for the purpose of cooling the air in its passage.

In the employment, for the abstraction of heat, of the evaporation of liquids, liquified gases, especially sulphurous acid gas, are preferably used. The vats in which the liquid to be cooled is placed are of wood lined with gutta percha; they run on rollers, and can be raised up so that the receiver containing the gas to be evaporated dips into them. Several receivers communicate with each other through tubes opened and closed by cocks. Supposing two receivers for the compressed sulphurous acid gas, of which one contains it at a pressure of three atmospheres, the other at one, then the taps should be so manipulated as to evaporate from the receiver at high pressure, "and to compress" in the receiver under lower pressure. As the liquified gas, on being liberated of the pressure on it, evaporates, it takes up the heat of the water in the vat. The sulphurous acid gas is generated in a furnace, heating an open vessel "containing the sulphur to be burnt," *and, by being driven* by a force pump into the receiver under great pressure, is liquified. The tank whence the sulphurous acid gas is driven off by heat, is kept supplied by means of another pump.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1853, February 3.—N° 300.

RICHARDS, William, and BECK, Edwin. — (*Provisional protection only.*)—"Certain improvements in machinery for exhausting and driving atmospheric air." This machinery may "be used for exhausting and driving air through mines and other similar places, and may be applied to ventilating or manufacturing purposes. The apparatus consists of an inverted cylinder attached to a vertical piston, and working up and down in a vessel of water. Appropriate valves are provided in the upper part of the cylinder, and the air is drawn into and forced from the inclosed space in the cylinder where required.

[Printed, 6*d*. Drawing.]

A.D. 1853, February 21.—N° 437.

JONES, Wright.—"Improvements applicable to steam pipes "used for warming, drying, or ventilating." They relate to a self-acting apparatus for getting rid of the air present in pipes before the influx of the steam, and of the water produced by condensation. It consists of a chamber, connected with the steam piping, and fitted with self-acting valves.

In one form, a channel, below the chamber, is open to the atmosphere by a pipe, and communicating with this channel is a barrel fitted with a valve connected to a lever worked by a float contained in a smaller chamber communicating with the larger one by an aperture. Towards the bottom of the main chamber is another valve linked to the lever of a large float. On the steam being admitted, the air in the pipes is driven forward, and escapes through the valve at the upper level into the passage below. On this taking place, any condensed water follows the same course, and the supply pipe being placed above the smaller chamber, it falls into it, and, lifting the small float, closes the opening at the bottom. Any further accumulation of condensed water in the casing raises the larger float, which then opens another valve leading to the channel below.

In another form, the self-acting air-valve is also used for *discharging the water*; and a bar of metal is so arranged as to close this valve as it gets gradually expanded by the heat of the steam. At the bottom of the chamber is a passage communicating with a valve linked to one end of a lever, the other end of which can turn on a centre, and is provided with a tail-piece so as to form a bell-crank lever. This tail-piece, by being let against a slot in a bar passing across the chamber, is actuated by the expansion of the bar by heat. As with the first form of apparatus, the air moves forward by the steam, makes its way out at bottom, until the expansion of the cross-bar closes the valve. On the water of condensation obtaining a certain level, it raises a float and opens the valve again. The inlet pipe has a wire gauze screen applied to it.

[Printed, 6*d*. Drawing.]

A.D. 1853, March 9.—N° 606. (* *)

CAMPIN, Frederick William. — (*A communication from Messrs. Owerduyn and Droinet.*)—" An instrument for measuring " the steerage-way of vessels, and the rapidity of currents of water " and air, applicable to ventilating ships and railway carriages." " This invention consists, first, in the aplication of hydrodynamic, " and more especially of negative pressure, as a means of measuring the speed of vessels and currents." Secondly, " in the use " and arrangement of metallic plates or elastic tubes for the purpose of determining the results of this pressure." " Negative " pressure is produced either by cylindrical or by double-coned " tubes, commonly called Venturi's tubes. " Their longitudinal " section represents two truncated cones united at top. They " will generally be used in preference to the cylindrical tubes, " without, however, entirely superseding them." The tube " is " in connexion with a mercurial syphon or manometer, and in " the mercurial syphon the rising and falling of the mercury " therein is the means of indicating the speed of the vessel or " the current."

These tubes may also be applied for the purpose of ventilating the ships. In this case the tube is to be furnished with a hook at each extremity, to which is attached a cord or chain. It must be immersed in the water at any part of the ship, with its smaller end pointed forwards. It has, like the other tubes, at its smallest section, a connecting pipe, but of a larger diameter. Fire-engine tubes might be usefully employed in this way. This tube or pipe ought to be flexible. The end of it opposite to that connected with the coned tube, is placed in the space whence the foul air is to be expelled. These arrangements being made, the mere progress of the vessel effects the required ventilation. This method of ventilation may be usefully combined with that in ordinary use, which is to infuse, by means of a canvas funnel, fresh air from the deck into the interior of the vessel. The same apparatus might, in certain cases at sea, be made available for pumping water.

[Printed, 10*d*. Drawings.]

A.D. 1853, March 18.—N° 675.

CHRISTIAN, Robert Oates.—(*Provisional protection only.*)—"Improvements in ventilating."

"My invention consists of two apparatus, one of which is "arranged to allow the exterior air to enter, and the other so as "to allow the vitiated air to escape. The first consists of a series "of cones of metal, which are placed one inside the other, and "so arranged that they may either rest one on the other in air-"tight contact, or be raised out of contact with each other, so as "to leave channels for the air to pass between them. There is also "an inverted cone, which is caused to rise and fall by the same "apparatus which moves the other cones; this cone is placed "over the opening into the chamber to be ventilated."

"The exit ventilator is similar to the one just described, with "the exception that, in place of the cones which rise and fall one "inside the other, a top cover is provided.

[Printed, 4*d*. No Drawings.]

A.D. 1853, March 30.—N° 760.

HENHAM, William.—(*Provisional protection only.*)—"Certain "improvements in regulating the draft in chimneys and other "outlets for smoke, air, and vapours." To the tops of chimneys, and of hop, malt, and other kilns, is applied an open frame carrying a plate or dome of greater diameter than the outlet, and also raised above it. This frame is of greater diameter than the plate or dome, and a space is left between them. The open frame is covered by wire gauze extending above the top of the frame. With kilns, larger openings may be made in the apparatus than when applied to chimneys.

[Printed, 4*d*. No Drawings.]

A.D. 1853, April 2.—Nº 786.

ANDERSON, Sir James Caleb, Baronet.—" Improvements " in locomotive engines." They relate to a form of boiler; a mode of working steam expansively; a form of strap for driving the wheels off the engine; and an arrangement for a " chimney " cap to increase the draught in the locomotive engine boilers, " and which may be used to cure smokey chimneys, or to draw " the foul air out of ships' holds." Instead of the usual blast pipe on the top of the chimney there is set a revolving cowl, formed as the frustrum of a cone, with its axis placed horizontally. This cowl opens into a space divided by longitudinal compartments lying parallel with the central axis of the cone. These compartments communicate by perforations with the smoke issuing up from the funnel, so that the draught produced in the cowl by the motion forwards of the carriage induces a current aiding the exit of the smoke. The longitudinal compartments are tapered conically in front against the air currents.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1853, April 7.—Nº 837.

BRYAN, Edward Langdon.—" Improvements in warming and " ventilating rooms and buildings."

" This invention consists of forming the lower part of a chimney " into an air chamber, by the simple addition of an iron plate " separating it from the upper part, and having a smoke pipe " passing through it and connected with the fire-grate. The said " chamber to be formed in the following manner, viz., its back " and sides by the back wall and side walls of the chimney itself, " its front by the back surface of the stove or grate, its lower side " or bottom by the hearthstone, and its upper side or roof by the " iron plate above mentioned; the said chamber to be connected " by an air shaft with the outer air, and with the apartment by a " long aperture between the top edge of the front of the grate " and the back of the chimney piece."

[Printed, 6*d*. Drawing.]

A.D. 1853, April 20.—Nº 951.

WEIGHT, Samuel.—Improvements in ventilating sewers, ships, buildings, &c.

"My invention consists in the use and application of a rotary " fly placed within a funnel or conical-shaped cast or sheet iron " or other metal box or casing, to which are connected tubes for " exhausting and discharging the contents of a receiver, which I " propose to place at or near the bottom of the place to be venti- " lated or discharged of the foul air contained therein; said re- " ceiver is connected by suitable tubing to the box or casing in " which the rotary fly is placed, and there is other tubing con- " nected to said receiver, which tubing is conducted to all parts " of the place to be ventilated. And I propose, when desirable, " to employ several receivers, which I connect together by tubes " or pipes."

[Printed, 8*d*. Drawings.]

A.D. 1853, May 4.—N° 1090.

HUTCHINSON, John Houseman.—(*Provisional protection only.*)—"Improvements in ventilating bricks." Apertures are made in the bricks, but "are not carried right through the brick, " and are only continued about one-half or two-thirds of the " distance from the top. When the bricks are put together, " a zig-zag opening or ventilating chamber is formed extending " to the distance required."

[Printed, 6*d*. Drawing.]

A.D. 1853, May 5.—N° 1111.

BUCKWELL, William.—(*Complete Specification, but no Letters Patent.*)—"Improvements in the construction of buildings." Bricks are used of the shape "of one hexagon, and of 'a part of' " another hexagon, or of two or more hexagons, with or without " parts of hexagons, or consisting of parts of two or more " hexagons made as one block or form." These bricks are made solid or hollow, with a coreing out in diameter about half of "the " distance across from parallel sides of the hexagon." The hollows afford "the means of ventilation, by making apertures to " the hollows from the interior and exterior of the building, " so as to allow for the escape of vitiated air, or the admission " of fresh air."

[Printed, 8*d*. Drawing.]

A.D. 1853, May 16.—N° 1212.

JONES, George.—"My invention consists in ventilating mines " by means of an exhausting or blowing machine placed at the

" top of one of the shafts and connected to an exhaust pipe " leading from the particular part of the mine to be ventilated or " having branches to different parts of the mine where foul or " vitiated air is present."

"The same arrangements would serve also when the ventilation " is effected by blowing or forcing in air to the back of the work- " ings, the machine or machines being then driven in the reverse " direction to that in which they are worked when exhausting."

[Printed, 8*d*. Drawing.]

A.D. 1853, May 18.—N° 1228.

BARSHAM, John.— Improvements in drying bricks, peat, fibrous materials, grain, or granular matters. Within a room or building are two rotatory fans, having openings below them for admitting fresh air, the room itself being open over and near the apparatus containing the granular matters to be dried. These apparatus consist of revolving vertical cylinders, having inclined blades on the axes. These vessels are preferably constructed of vertical bars; when for grain or granular matter, of perforated metal; and with closed bottoms when used for fibrous substances. Bricks and similar articles are dried on a revolving table. Two cockle-stoves are also set up in the room in order to heat the air as it gets renewed from the outside by the action of the fans.

[Printed, 10*d*. Drawings.]

A.D. 1853, May 23.—N° 1268.

DEVY, Amédée.—(*A communication.*)—(*Letters Patent void for want of final Specification.*)—" Improvements in storing and " preserving grain." Granaries are so arranged that the grain stored may be traversed in all directions by perforated tubes or air passages through which air can be forced. Gases and vapours that can kill insects and check fermentation may also be passed through the tubes with the air.

[Printed, 4*d*. No Drawings.]

A.D. 1853, May 25.—N° 1280.

LOVELL, James.—" Improvements in heating and ventilat- " ing."

"This object is accomplished by means of apparatus consist- " ing of a furnace or fire-place communicating with a heating

" chamber, in which is contained another chamber with a down-" cast and upcast shaft for the passage of impure heated air into " and out of it. There is also a cold air drain for the admission " of fresh external air into the heating chamber. The heat as it " passes from the furnace into the chamber is in a great degree " absorbed by the inner chamber, and by means of this concen-" tration of heat the impure heated air or vapour is drawn into " the latter from the floor of the building by the downcast shaft, " and is discharged by the upcast shaft, the fresh external air " entering the heating chamber, and after becoming heated, being " made to pass into the building through any convenient openings " in the floor."

[Printed, 6*d.* Drawing.]

A.D. 1853, May 25.—N° 1281. (* *)

BAUER, William.—(*Provisional protection only.*)—This invention consists in so forming a vessel or boat, which it is proposed to call an "hyponaut apparatus," that it will either float on the surface of the water, or it may be made to descend under the surface of water, and when in either of these situations it may, by machinery within and outside the boat, be propelled and guided in any direction.

Regarding the ventilation of this vessel the inventor states—" When the air in the boat, which is of no more than the simple " atmospheric pressure, becomes foul by respiration or otherwise, " a fresh supply may be drawn down a tube from above the sur-" face of the water, and the foul air be at the same time driven " out by double-acting air-pumps. The motive power is so " generated as not to consume any atmospheric air. It consists " of a mixture of nitre, sulphur, charcoal, and ammonia, which, " on being ignited, produces a gas or vapour of the requisite " tension to work a piston similar to that of a steam engine."

[Printed, 4*d.* No Drawings.]

A.D. 1853, June 4.—N° 1381.

BIRAM, Benjamin.—Improvements in fans for ventilating mines. The fan consists of a revolving wheel in which the air is admitted at the centre, and propelled from blades placed at the circumference by centrifugal force, and the improvement consists in placing the blades "tangentially or at an angle between a "radial and tangential direction."

[Printed, 10*d*. Drawings.]

A.D. 1853, June 17.—N° 1478. (* *)

LISTER, Robert.—"The arrangement and construction of "chimney-tops or flue passages with tubular thoroughfares so "continued as to aid the chimney draught and ventilation and "prevent down draughts. These tubes may be applied either "inside or out; when outside, the tubes are disposed with their "open lower ends near the base of the chimney top or can; these "open ends forming a ring round the main shell. Starting from "this point, each tube is wound spirally round the outside of the "shell, and terminates by entering the shell near the top."

Straight tubes may be employed, or the chimney-pot may be made double, so as to leave an annular space between the shells, with a ring of perforations below.

Such arrangements are applicable "also to the ventilation of "public rooms, warehouses," &c.

[Printed, 6*d*. Drawing.]

A.D. 1853, July 12.—N° 1663.

BAKEWELL, Thomas Hill.—"Improvements in ventilating "mines." The ventilation is effected by exhausting the foul and injecting pure air; both are carried on at the same time in an apparatus which consists of a number of pumps, each of which consists of a cylinder, inner tube, and piston, "with hollow "suckers," and which all discharge their air into a "culminator," or dome-shaped vessel, fitted with a metal valve which prevents the return of the air and from which the foul air is discharged into the atmosphere or the fresh air passes into the mine.

[Printed, 10*d*. Drawings.]

A.D. 1853, August 9.—N° 1851.

HALL, Thomas Young.—Improvements in supplying air to lamps, and in ventilation. "The ingress and egress of air is regu"lated by a screen composed of a series of bars ranged side by "side, and opened or closed by a screw." "The ventilating "screen may be also obviously applied to ventilating purposes in "apartments, ships, and holds of vessels."

[Printed, 1*s*. Drawings.]

A.D. 1853, August 17.—N° 1925.

KIRKWOOD, Thomas.—"My invention of 'Improvements "'applicable to ventilation and other purposes' consists in forcing air or other gases into a pipe passing into the building "or space required to be ventilated."

"The apparatus or mechanism for the purpose consists of a fan "composed of four vanes (more or less) which is made to revolve "within a trough or case containing water or other liquid, by "means of which external air or gas admitted into the vanes may "be expelled therefrom through a cavity or pipe in the centre of "the fan (or forming the axis thereof), and forced into a chamber "in the upper part of the case containing the fan, whence it is "discharged into a conical pipe contained within another pipe "leading to the building or space required to be ventilated or "purified."

[Printed, 6*d*. Drawing.]

A.D. 1853, September 9.—N° 2078.

DOYLE, John.—(*Provisional protection only.*)—Improvements in the ventilation of tents consisting "in attaching to orifices, in "the walls of tents and marquees, funnels made of the same "materials as the tents and marquees, and which being carried "upwards within the same, will admit a current of fresh air to "communicate with either the door or with any ventilating arrangements at the top of such tents and marquees, and which "while so doing will exclude rain."

[Printed, 4*d*. No Drawings.]

A.D. 1853, September 10.—N° 2097.

TRONSON, Robert.—Improvements in ventilating vessels laden with coal, consisting in "applying numerous vertical or upright tubes of iron or other suitable material extensively perforated with holes. In loading a ship or vessel, these tubes are "placed or fixed upright in and rise up above the coal, culm or "cinders, in such manner that any gas or vapour evolved from "the same may rise up such tubes and be removed by means "of any suitable exhausting apparatus, which, preventing accumulation of inflammable matters, will prevent spontaneous "combustion."

[Printed, 4*d*. No Drawings.]

A.D. 1853, September 19.—N° 2174.

RESTELL, Thomas.—" Improvements in opening and closing " ventilating louvres."

" My invention consists in adapting to one side of the frame " in which the louvres are mounted a rod or bar with as many " pins or studs projecting from it as there are louvres, such " louvres being each retained in separate frames. When the " louvres are closed the rod reaches to the bottom of the side of " the frame, by raising the rod by means of a string or cord " passing over a pulley at the top of the frame the studs come in " contact with the arms of the louvre mountings and cause them " all to be opened simultaneously and to an equal distance. " Upon letting down the rod the weight of the louvres causes " them to close wholly or to the extent required."

[Printed, 6*d*. Drawing.]

A.D. 1853, October 11.—N° 2333.

HARRIS, James.—(*Provisional protection only*.)—Improvements in heating air for warming and ventilating, consisting in passing the air through a number of tubes contained in a cylinder through which steam from a boiler is allowed to pass so as to encircle and heat the tubes.

[Printed, 4*d*. No Drawings.]

A.D. 1853, October 14.—N° 2369.

PALMER, William.—" Improvements in ventilators."

1. For ventilating apartments the upper part of the window frame is formed " with a box or chamber running the whole length " thereof to receive a telescopic or other ventilator, which is com- " posed of single or double plates of perforated zinc or other " metal, wire, gauze, or glass."

2. A second form of ventilator consists of a quadrant, the sides of which are formed of perforated plate or gauze, and which turns on a pivot in a box or case so as to expose as much of the perforated surface to the entrance of the air as desired. The ventilator may be made in the form of a sliding cylinder with perforated sides.

3. For railway and other carriages, &c. a curved or indented perforated plate is fixed across the centre of the ventilator, which consists of a rectangular case lined with perforated plate for the

purpose of arresting dust, &c. For the tops of such carriages a perforated casing is used with a second smaller casing placed inside it; the two cases may be variously adjusted.

[Printed, 8*d*. Drawing.]

A.D. 1853, October 24.—N° 2448.

KRAUT, Henry.—Improvements in regulating the admission of air to furnaces, rooms, &c., "by effecting the opening and "closing of dampers, slides, valves, cocks, &c., by means of the "electric current." For this purpose electro-magnets are employed, which act on iron bars connected by means of levers, &c., with the dampers or valves. The current by which the magnets are rendered active is not complete when the temperature is low, but when the heat rises the circuit is completed by the expansion of a simple or compound metal bar, and the magnets becoming active set in motion the levers and open the dampers to admit cold air, or vice versâ.

[Printed, 8*d*. Drawing.]

A.D. 1853, November 18.—N° 2676.

HOLMES, Thomas.

"The nature of my invention consists in improving the ven- "tilation of drying stoves by conveying the heated air, after it "has absorbed the moisture in the goods to be dried, through "flues, which are opened when required, and which I prefer to "place near the floor of the drying stove."

The dry air is forced into the stove by means of a fan.

[Printed, 6*d*. Drawing.]

A.D. 1853, November 19.—N° 2688.

HARRIS, James.—Improvements in heating air "for warming "and ventilating buildings."

"The apparatus consists of a vertical cylinder or vessel fitted "with a series of tubes in a similar manner to the boiler of a loco- "motive engine." Steam is admitted into the cylinder and around the tubes, and the air is heated by passing through them.

[Printed, 8*d*. Drawing].

A.D. 1853, December 3.—N° 2814.

ROGERS, Abraham.—(*Provisional protection only.*)—Improvements in ventilating sewers, mines, &c.

"1st. I propose to construct two or more ovens with chimney "or shaft, of such materials, form, and dimensions as may be "required for the production of heat by the manufacture of "coke."

"2nd. I propose to construct over these ovens an archway "which shall extend between the chimney shaft and the sewer, "mine, or other place to be ventilated, and also to connect the "mouths of the ovens, by means of a tube or pipe, with the place "to be ventilated, so as to obtain a constant draught of air to "pass through the oven to facilitate combustion and ventila- "tion."

[Printed, *4d*. No Drawings.]

A.D. 1853, December 17.—N° 2942.

GREENWOOD, John.—Improvements in preventing the entrance of air into rooms when the doors and windows are shut, consisting in—

"Applying strips of vulcanized india-rubber on the parts against "which a door or window closes or comes in contact with, or "such strips of vulcanized india-rubber may be affixed to the "doors or windows, so that when a door or window is closed "the strips of india-rubber will ensure all parts being closed so "as to prevent draughts of air passing."

The strips are fixed on in different ways, and are placed so that one edge is free, and presses like a spring against the side of the door, window, &c.

[Printed, *6d*. Drawing.]

A.D. 1853, December 19.—N° 2950.

CROSSBY, William.—(*Provisional protection only.*)—Improvement in the ventilation of granaries, and machinery for grinding grain, consisting in effecting—

"By the application of a fan and perforated pipes or tubes "(arranged in a manner which shall be deemed the most suit- "able according to the construction, formation, or dimensions "of the place of deposit), the ventilation of grain with hot or "dry air, so as to conduce greatly to its preservation, as also to "its preparation, for grinding; and also, by the application of a "fan and pipes or tubes, the extraction of hot air, and the sub- "stitution (in every compartment of the machinery used for the

" grinding of grain and dressing of grist, and grinding generally)
" of a constant supply of cold, fresh, or atmospheric air."

[Printed, 4*d*. No Drawings.]

A.D. 1853, December 30.—N° 3027.

MARLOR, Joseph. — Improvements in ventilating mines. Within the shaft of the mine is fixed a vertical air-tight tube suitable for the passage of the "cages" carrying wagons and men; the cages are closed in at the top where they are provided with valves opening downwards and also with valves or flaps, fixed round the upper edge which press against the sides of the tube when the cage is descending, but which hang down freely when it ascends. The cage thus forms a piston, and serves in its descent to force air into the mine. Injection and ejection valves are placed at the bottom of the tube; "a safety valve" is added to close the tube in case of the chain breaking and the descent of the cage being too rapid.

[Printed, 8*d*. Drawing.]

1854.

A.D. 1854, January 2.—N° 4.

GOWANS, James.—Improvements in heating and ventilating apartments.

" This object is accomplished, in the first place, by adapting " and applying to the back of kitchen grates or ranges a chamber " with partitions, or a set of flues, by means of which the external " air may be made to pass along behind the fire, and return before " it passes into the apartment required to be heated. The " external air may be admitted in any convenient manner to an " inlet flue communicating with the chamber or flues on one side " of the grate, and the warm air may be conveyed from an outlet " flue on the other side, and supplied to the appartment or ap- " partments required to be heated by means of hollow bricks or " channels formed in the walls."

" The vitiated air or vapour may be allowed to pass out of the " apartment by means of hollow bricks or channels inserted or " *formed in the* walls or partitions, and communicating with the

" main tube or funnel which is carried up in immediate connection
" with the vents at the top of the gable."

[Printed, 8*d*. Drawing.]

A.D. 1854, January 5.—N° 24.

JOHNSON, John Henry.—(*A communication from John Chilcott and George T. Palmer.*)

"This invention relates to the cooling and ventilating of carriages and buildings in general, but more particularly to the ventilating of railway carriages, and consists in the employment of a film of water kept constantly trickling over a web of fibrous, porous, or perforated materials stretched over the windows of the carriage or building to be cooled. By this means the incoming air is perfectly cooled, and the entrance of dust effectually prevented. In place of fibrous material, plates of glass of an angular form may be so arranged as to be constantly kept moist with running water. As applied to railway carriages a tank of water is fitted to the bottom of the carriage, and the water is pumped up to another reservoir on the top of the carriage, the pumps being worked by a wind wheel of a peculiar construction. This wheel contains a series of buckets or chambers arranged circumferentially, and is surrounded by a number of moveable wind guides to direct the wind upon the wheel in the proper direction from whatever quarter it may be blowing."

[Printed, 1*s*. Drawings.]

A.D. 1854, January 11.—N° 70.

VETILLART, Marcel.—"Improvements in drying woven fabrics, yarns, and other goods."

Three forms of drying chambers are shewn, and in all the draught may be produced either by injecting air at the bottom, or exhausting it upwards.

A drying chamber is arranged for the goods to be dried to enter into it at the upper and pass out at the lower part. The heated air entering at its lower part is caused to act first on those parts of the goods which, having descended from the upper part of the chamber have become partly dry, and then the heated air passes upwards and acts upon the less dried goods. A series of trays are used with closed bottoms, and they are introduced in succession at the upper part of the drying chamber, one tray being taken out at the lower part to allow of the others descending. The trays are made with openings alternately at the back and front, by which they act as so many partitions within the drying chamber, and cause the air which rises from below to pass to and fro over the goods in the succeeding trays. The trays are on wheels; they are run in and out on rails, being let down by means of adjustable arms at the bottom of the chamber.

In those cases where fabrics can be supplied in a continuous web, in place of using trays or moveable partitions a succession of fixed partitions are employed. Guide rollers conduct the woven fabrics alternately between the succeeding partitions, the openings into the spaces between the partitions being at their alternate ends.

When yarns or warps are dried, the partitions may be dispensed with. A tall chamber may be made with a series of horizontal partitions, with slits for the passage of the fabrics. Every other partition alternately is fixed to the side of the chamber, so that the draught is obliged to take a zig-zag course from the bottom to the top. The fabrics are wound from rollers at the bottom up through the slits in the partitions and then down again out at each side.

[Printed, 10*d*. Drawing.]

A.D. 1854, January 27.—Nº 206. (* *)

PALMER, William.—Tubes or hollow blocks of earthenware or brick earth form the subject of this invention. They are intended to be employed in the construction of the walls, floors, and roofs of buildings "and for ventilation." Those "for walls " being made suitable for standing upright side by side, either in " one or more rows;" they are open at the ends, and are, if needful, made with grooves, into which cement can be run for rendering the joints water-tight. Special forms for flues, door and window openings, roofs, and floors are described. In putting together, cylindrical tubes are employed that will fit into the cavity of the square ones, and the spandrils between the circular inner and square outer tubes are run with cement. The inner and outer tubes break joint for greater strength. Provision is made for wood fillets to which to nail floor boards, door frames, &c.

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1854, March 8.—N° 552. (* *)

BRUNTON, John Dickinson.—(*Provisional protection only.*)—"Improvements in wind guards or chimney tops." (1.) Their tops are surrounded "with a broad bevilled rim going round the "entire circumference, from which the smoke or air escapes, and "at short distances from each other a series of fixed vertical vanes, "wings, or partitions are fixed, so as to divide the bevelled surface "into a number of channels to collect and direct the atmospheric "air passing over such chimney-tops by natural external currents, "which currents sufficiently exhaust the flue to facilitate ascension "of the smoke or air, or both, from the apartment thereto "belonging." (2.) Chimney-tops are constructed "with a cone "suspended by rods or brackets over the escape aperture, leaving "an area for escape around the cone equal to the area of the "chimney-top, and the horizontal diameter of the cone is to be "rather more than less than the diameter of the top of the flue or "chimney-top." This cone is covered over by a hood of the same shape and height.

[Printed, 4*d*. No Drawings.]

A.D. 1854, March 10.—N° 573.

PEACE, William.—Improvements in indicating the flow of air through a mine, pipe, &c.

A flat disc is suspended by a cord or wire to the end of a beam, which is weighted at the other end with a variable amount of weight. The draught or current of air from the mine, &c., impinges on the disc and raises the balance weight more or less, the amount of raising and consequent pressure being indicated by a dial and pointer attached to the pivot on which the beam turns.

[Printed, 8*d*. Drawings.]

A.D. 1854, March 22.—N° 673.

FAST, William.—(*Provisional protection only.*)—"My invention "consists of an improved ventilator for windows, and is self-"acting, or rises and falls by the opening and shutting of the "window to which it is attached. I construct the said venti-"lator with one or more plates of perforated metal, which extend "the width of the window. These plates may be either single "or double. When single, they are placed face to face; when

" double, one within the other, so as to slide up and down or in " and out. The ventilator may be enclosed in a shield or case, " or shut into a recess formed for the purpose."

[Printed, 4*d*. No Drawings.]

A.D. 1854, April 17.—N° 881. (* *)

HAWKINS, Thomas.—" Apparatus for creating an upward draft " or current of air in chimneys, which apparatus is also applicable " to the purposes of ventilation." " A conical or funnel-shaped " piece of metal or other material, whose bottom circumference is " of the size of the top of the chimney or tube. Across the upper " or larger diameter of this cone or funnel is a bar or rod for the " purpose of receiving the axis or shaft of a semicircular plate, " which serves as a horizontal moveable cover to one half or more " of the top of the cone or funnel." To this plate is attached a vane for the purpose of keeping the plate to windward. This apparatus may be made square, with the slides inclined.

Another form of apparatus consists of " a series of interior " circular forms of metal or other material, having their outer and " inner peripheries slanting also obliquely upwards. By these " means there is constituted between each of them conical or " funnel-shaped open spaces, through which the air rushes " upwards by reason of the action of the wind upon these oblique " conical sides or surfaces."

[Printed, 8*d*. Drawing.]

A.D. 1854, May 4.—N° 1002.

MANLEY, John.—" An improvement in ventilation."

" My invention consists in leading air from any place requiring " to be ventilated, or smoke and the products of combustion, into " a bent pipe, tube, flue or shaft. Near the top of the bend, and " on the side opposite to that at which the air or smoke and " products of combustion enter, I introduce a stream of water, " and cause it to descend the pipe, tube, flue, or shaft through a " rose or distributor. The air or smoke will be drawn over by " the descending streams of water, and will be carried down with " the water."

[Printed, 6*d*. Drawing.]

A.D. 1854, May 8.—N° 1031.

LEMIELLE, Théodore.—" Improved apparatus applicable to " the ventilation of mines, buildings, and other places."

The apparatus consists of a cylinder, in the inside of which revolves an eccentric and smaller cylinder, which touches the inner side of the larger cylinder at one point. Two orifices for the passage of air are made in the larger cylinder, and two flaps or valves are hinged to the inner cylinder, so as to rest with their free ends against the inner surface of the outer cylinder, and to lie flat on beds formed on the surface of the inner cylinder, alternately. The motion of the two flaps is so adjusted by a crank that one is drawing air in at one opening, while the other is forcing it out of the second opening.

[Printed, 8*d.* Drawing.]

A.D. 1854, May 18.—N° 1116.

CUNNINGHAM, JOHN, and **ASHLEY,** WILLIAM.—Improvements in ventilating ships.

"We fit up the ship to be ventilated with air trunks, suitably " arranged for conveying air, after it has been acted upon in the " manner herein-after described, to lateral or branch pipes in " connection with the various cabins and berths, and we supply " the air to these main trunks by means of suitable fans or " blowers driven by motive power machinery."

The air is passed through a chamber in which cold water or disinfecting fluid is violently agitated by a spindle carrying blades, so as to take the form of "spray," and is thus cooled and purified.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1854, May 31.—N° 1207.

ROGERS, ABRAHAM.—(*Provisional protection only.*)—Improvements in ventilating mines, sewers, &c.

"I propose to construct in the most eligible and convenient " position a chimney or shaft, and in connexion therewith two " or more coke ovens, or other arrangements for producing " heat.

"2nd. I propose to construct an archway over or otherwise " in connexion with the coke ovens of other arrangements for " the production of heat; and such archway or tunnel or other " means of communication between the mine, sewer, or other " place to be ventilated, and the chimney or shaft to be kept in

" a constant state of heat by such arrangements, so that the " deleterious gases shall be drawn into the shaft or chimney."

[Printed 4*d*. No Drawings.]

A.D. 1854, June 8.—N° 1264.

ALLDRITT, William.—(*Provisional protection only.*)—" Im- " provement in lighting and ventilating," consisting in fixing above gas burners a " telescopic tube."

"This tube conveys the heated air and gases from above the " flame of the gaslight through the ceiling and thence to the " atmosphere. The wider sections of the draught tube are " placed uppermost, and the lower portions of smaller diameter " rise inside them on the chandelier being raised." "The lower " part of the draught tube opens above the gas flame in the glass " globe, if one is employed, or in a trumpet or bell-shaped mouth " of any suitable material; and where there are two or more " burners, branch tubes are carried from the main draught tube " to them."

[Printed, 4*d*. No Drawings.]

A.D. 1854, June 16.—N° 1307.

FELL, Thomas Mara, and COOKE, William.—" Improve- " ments in ventilators."

1. For ventilating rooms a parallel " rule-jointed ventilator " is fixed to the upper part of the sash of the window, and to the window frame above, so that it unfolds and covers the space left open by the window when let down.

2. For ventilating flues and pipes a metal box is employed, the front of which consists of a hinged door or valve, and the top through which the air passes of perforated plate or wire gauze.

3. For churches, &c., a circular plate with segmental orifices filled with wire gauze and covered with a revolving plate is employed.

[Printed, 6*d*. Drawing.]

A.D. 1854, July 31.—N° 1684.

ADAMS, Henry.—" A revolving ventilator." This ventilator consists of a simple fan formed of flat rectangular plates or blades fixed radially on a vertical axis, and set in a rectangular orifice in a window, &c., so that it revolves close to the sides of the orifice; the air enters at one side and passes out at the other side of the axis.

[Printed, 8*d*. Drawing.]

A.D. 1854, September 5.—N° 1943.

TRIMBLE, ISAAC PIM.—Improvements in ventilating and regulating the temperature of buildings. The admission of air and consequent temperature is regulated by valves which are acted on by the expansion of strips of zinc, so that when the temperature rises the valves are opened or vice versâ. The strips of zinc, which are made thin so as to be readily influenced by the temperature of the air, are formed into a long chain which passes over a series of rollers, one end being fixed, and the other attached to a spiral tension spring. In the centre of the lowest strip, which is made in two parts, is fixed a metal plate to which is suspended a weight which rises or falls as the chain of zinc strips contracts or expands, and is connected by multiplying pulleys with the ventilating valves. The zero point or temperature at which the valves are closed, is regulated by a screw, by which the length of the chain of strips can be altered.

[Printed, 10*d*. Drawings.]

A.D. 1854, September 8.—N° 1956.

BURNS, JAMES.—"Improvements in ventilating ships," consisting in applying "the rising and falling of the waves to force " fresh air from the outside to the lower and other parts of the " interior of ships." For this purpose a tube open at the lower end is fixed so as to project downwards into the water; the waves rise into this tube and force the air with which the upper part is filled through a valve and thence by pipes to the locality where it is required; on the waves falling, the valve closes and prevents the return of the air, while a second valve opens and allows the air to enter the upper part of the tube.

[Printed, 1*s*. Drawings.]

A.D. 1854, October 2.—N° 2116.

STEPHENS, JOHN.—(*Provisional protection only.*)—"Improve" ments in apparatus for supplying purified air to rooms or " buildings."

"For this purpose there is a close chamber employed, which is
" divided by several shelves or partitions in such manner that
" the air, in passing through the chamber, shall be forced to take
" a tortuous or zig-zag direction, and in doing so it is brought in
" contact with charcoal and other matters for purifying the air,
" and also for depriving it of moisture; and there are partitions
" of woollen fabric to filter the air through, so as to remove any
" dust or other substantive impurities. The air supply pipe into
" this apparatus is made to communicate with the outer air, and
" when desired, this pipe may pass through a chimney or flue, so
" that the pipe may be externally heated. The outer pipe or
" passage has applied to it a fan or instrument for propelling air
" into the room or building."

[Printed, 4*d*. No Drawings.]

A.D. 1854, October 19.—Nº 2240.

HIGGINS, Thomas.—(*Provisional protection only*.)—Improvements in ventilating ships and mines.

"This invention consists of two circular tubes or pipes, in
" which are placed shafts with screws formed upon them, so as
" to fill the space within the pipes or nearly so. The screw shafts
" are mounted upon suitable bearings, and are each provided at
" the upper end with a fan turn cap, which is acted upon by the
" wind, and which give motion to the screw shafts. One of the
" screw shafts rotates so as to carry a current of air down the
" pipe, and the other travelling in a reverse direction will cause
" a current to travel up the pipe."

"A screen (or hood) is attached to the top of the pipes which
" is mounted so that it will shift round to protect the portion of
" the fan cap or wind propeller not required to be acted upon by
" the wind."

[Printed, 4*d*. No Drawings.]

A.D. 1854, October 28.—Nº 2300.

VAUTHIER, Claude François.—" Improvements in blowing
" machines, suitable, amongst other purposes, for the ventilation
" of mines, &c."

"I take a cylindrical metallic vessel having an aperture in the
" centre of both its top and bottom covers. Through the aper-
" ture in the top cover a solid piston rod passes, while a hollow

"piston rod works in the opening in the bottom cover, through "which the air is ejected. In both the top and bottom covers, "and near the edge of the same are annular orifices provided "with valves of india-rubber, gutta percha, or other like suitable "material, which open inwards, and are intended for the admission of air or other fluid into the machine. In the cylindrical "vessel is a piston, consisting of two plates, the upper of which "is fixed on to the before-mentioned solid piston rod, which "passes through the upper cover, while the lower plate is in a "single piece with the hollow piston rod, which works through "the bottom cover, and through which the air or other fluid is "ejected or expelled. Both plates have openings, through which "the air or fluid passes into the piston from the cylinder," and these openings are provided with valves.

[Printed, 6*d*. Drawing.]

A.D. 1854, November 10.—N° 2386.

WIGGINTON, WILLIAM LAWRENCE. — "Improvements in ventilating dwelling houses. Air is conveyed by a pipe passing from the external air to a stove, through which it passes and is conveyed by pipes to the rooms to be ventilated.

"From the tube conveying warm air a valve would open into "each room, being flush with the wall, or I would have an extra "elbow to move vertically, which could be opened or shut by "the inmates. To regulate the heat when not required, a stop "at the outer aperture of the air pipe could be closed."

"A ventilator would be placed over the parlour door, as near "the ceiling as possible, another over the staircase door or passing "from the living room to the staircase, one each over the bedroom doors; an open rosette in the ceiling of staircase, communicating with a funnel-mouth zinc pipe to be conveyed over "the ceiling joist, and through or near the apex of the roof, with "a raised cap at the top to protect it from the weather."

[Printed, 8*d*. Drawings.]

A.D. 1854, November 10.—N° 2388.

JEAKES, WILLIAM.—(*Provisional protection only*.)—Improvements in heating and ventilating by gas.

"For this purpose I provide a metal pipe, to which I attach a "series of parallel metal plates set at any required distance

" apart. To this pipe I apply a gas burner for imparting heat " thereto, which heat is taken up by and distributed over the " series of plates. This apparatus I enclose in a case which is " open at top and bottom for the passage through of air, which " air, by coming in contact with the heated plates, will become " heated, and when allowed to escape into an apartment will " diffuse the required amount of heat to the apartment. It will " be obvious that this apparatus may be used for drawing off " vitiated air from buildings, a suitable provision being made for " the admission of fresh air to supply the place of the current " drawn off by the apparatus."

[Printed, *4d.* No Drawings.]

A.D. 1854, November 16.—Nº 2433.

LOW, WILLIAM. — "Improvements in ventilating mines." "My invention consists of obtaining the requisite heat to the " air in a shaft of a mine by the employment of steam in pipes, " or other forms of apparatus capable of offering extensive heating " surfaces to the passing air." "The steam is conducted by a " suitable pipe from the boiler down the shaft into the air-" heating apparatus (composed of pipes or tubes, or other forms " capable of offering extensive heating surface to the passing " air), which is placed below the shaft, where the ordinary furnace " has been heretofore situated, or in other convenient position."

[Printed, *4d.* No Drawings.]

A.D. 1854, December 8.—Nº 2584.

ACRES, EDWARD.—" Improvements in drying wheat and other " grain." The grain is kept in thin layers over a perforated floor, and a fan above is made to exhaust through it a volume of heated air led from a stove below.

The apparatus for heating the air consists of a stove, the fire-box of which is encased in a jacket, perforated at the lower part of the two sides and back, through which air is supplied to the fire-box by means of a conduit of masonry extending round the two sides and back of the stove. The upper part of the jacket also contains openings corresponding in area with those at the lower part through which the heated air may pass up through the covering of the kiln, to which the fire-box is connected. A pipe extends from the side of the jacket enclosing the fire-box to the outer side of the kiln in order to give draft to the fire. There is also a funnel above the upper part of the stove extending to the centre of the air chamber of the kiln, from which branch off radial pipes. The top of this funnel is covered by a perforated metal plate forming the floor of the air chamber.

The kiln itself has a cover of tiles or of perforated metal, constituting the top of the air chamber, upon which the grain is agitated so as to be acted upon by the heated air. A vertical shaft driven by gearing has at its lower part radial arms, to some of which are applied transversely cane brushes for driving the grain from the centre to the sides of the kiln. Other cane brushes drive the grain back to the centre. There are also coulters applied to some of the arms to turn up the grain and promote uniformity in the drying of the whole mass.

The air in the head of the kiln above the whole is drawn up by an exhaust fan, in order to produce a current of heated air through the grain. At some distance above the stove is also a main flue, opening over the fire-place and running into the centre of the kiln, and the supply of cold air it then receives is distributed by means of branch pipes beneath the lower perforated plate, which forms the bottom of the air chamber of the kiln.

[Printed, 10*d*. Drawing.]

A.D. 1854, December 14.—N° 2636.

HENDERSON, PETER EDWIN.—(*Provisional protection only.*) —" Improvements in ventilating ships."

" To any suitable part of the ship's sides I connect at pleasure
" fan wheels, which receive rotary motion from the water, either
" directly or through the medium of gearing, or other suitable
" mechanism; the use of the said fan wheels (when employed
" for the purpose of ventilation) being to induct fresh air into a
" small cupola, and from thence to force it through gutta-percha
" or other tubes to the cabins or other parts of the vessel which
" it is desired to ventilate, said gutta-percha tubes having cocks
" connected thereto, by opening which fresh air may be directed
" at pleasure to any cabin or other part of the ship; and by
" reversing the direction of motion of the fan wheels, the aforesaid
" tubes may be used as respirators."

[Printed, 4d. No Drawings.]

A.D. 1854, December 22.—N° 2703.

SUTER, Alfred.—(*Provisional protection only.*)—"A wind "guard to cure smoky chimneys, or ventilate rooms or buildings."

"A chimney pot, about 12 inches high by 9 or 10 inches diameter, over the mouth of which is fixed, by rods about 5 inches "high, a disc, the same size as the mouth of the pot, thereby "leaving an ample smoke opening, to protect which from the "wind a band is placed round the smoke opening, about "7 inches deep by 18 inches diameter, fixed to the edges of the "pot and the disc by rods, and covering by about 1 inch the "edge of the pot and the disc, thereby entirely preventing the "smoke being blown back into the chimney, the smoke having "free egress at the top and bottom of the guard band."

[Printed, 4*d*. No Drawings.]

A.D. 1854, December 23.—N° 2715.

ANDERSON, George.—Improvements in ventilating and purifying sewers and buildings.

"The improvements consist in withdrawing the noxious vapours "from the sewers by a pump, fan, or other suitable exhausting "apparatus, and forcing them into combination with suitable "deodorizing means."

The apparatus preferably employed is that described in Specification No. 2939, A.D. 1853.

"The purifying means in the receiving chamber may be lime, "such as used in the purifyers of gas works; peroxide of iron "or other metallic salts, or dilute acids, or acids held by peat, "coke, gravel, charcoal, sawdust, or other matter; or they may "be other matters or gases of a deodorizing tendency, and "having a chemical affinity for the particular gases to be operated upon."

[Printed, 4*d*. No Drawings.]

A.D. 1854, December 27.—N° 2726.

NASH, John.—"Improvements in the means or process of dry-"ing malt, grain, or roots." The ordinary "low room" of the kiln is used for the "growing or withering" of the grain before being dried. The floor of the drying chamber receives the fibres, roots, and "comb" falling down while the grain is being dried, and it is built with a number of short pillars for carrying joists which themselves support rafters for "the perforated plates, tiles, "or metallic wirework, on which the wire on which the malt, "grain, or roots rest during the operation of drying." Between these balks and tile floor are hot water pipes and flues. The ventilation of the kiln is effected through a number of holes on each side, communicating with the chamber containing the hot water pipes and flues. The air from the outside enters up through the perforated carriers for the malt, and then through it. Or these apertures may be closed by caps. The "low room" is ventilated by holes left in the ceiling, and in conjunction or not with them. On the outside of the kiln is the house and furnace for generating the heat passing through the ascension pipes to flues laid under the bearers of the hot water pipes, and thence to the chimney. The hot water flows from the furnace up ascension pipes into expansion chambers, and thence descends to serve a length of zig-zag piping, extending over the whole drying floor.

[Printed, 10*d*. Drawing.]

1855.

A.D. 1855, January 3.—Nº 25.

MUIR, George Walker.—"Improvements in warming and "ventilating," consisting in—

"Forming the jambs and mantle-piece in connection with "open domestic, register, or other grates, hollow, and all of "metal, in order that, the external air being admitted into the "chambers thus formed, it may be thereby heated and discharged "into the room from the mantle-piece.

"Protecting the ends of the iron pipes employed in heating "air from the action of the fire by joining a short piece of clay "pipe thereto.

"Dividing a cylinder or shaft into three or more parts longitudinally, partly constructed of perforated sheets of metal or "other suitable substances, which sheets are set at various suitable distances from each other, the said cylinder or shaft to "be used for the ingress and egress of air to and from buildings,

" with provision for the collection and escape of water, and with " valves to open and shut.

"The arrangement of a shaft for the abstraction of air from " stoves or buildings into and by the draft of the furnace used in " heating the same."

" The use of two or more sheets of perforated metal or other " suitable substances for the ingress and egress of air to buildings " at or near to the ridge of the roof thereof, with a provision for " the collection and escape of water.

" The construction of chimneys or shafts double throughout " their whole height, for the abstraction of vapour from drying " stoves or apartments, and the smoke and gases from the furnace " used for heating the same, the inner chimney being of metal " and the outer of brick or stone.

" The construction of a double cowl to be fixed on the top of " the double shaft.

" The use of cowls for the ingress and egress of air into and " from buildings, the cowl used for the admission of air having " the vanes so placed as to keep the opening of the cowls " towards the wind, and those used for the egress having the " vanes set in the usual way, the cowl used for ingress having " the mouth covered by two or more sheets of perforated metal " or other suitable substance."

[Printed, 1*s*. Drawings.]

A.D. 1855, February 15.—N° 346.

DELABARRE, Christophe François. — " Improved apparatus to be used in propelling gases and forcing liquids." This is a modified form of the steam jet pump. The action of a jet or current of a fluid or liquid, whether of water, steam, air, gas, or of a combination of steam and air or other gases, can be compared to an endless succession of infinitely thin moving pistons. According to the main feature of this invention, a mixture of steam and air is used, the intermingling of the two fluids being obtained by projecting a small jet of steam or also compressed air into a larger channel or a succession of channels, increasing in size and open to the atmosphere, or other source of an extraneous fluid, so that the air or gas is induced or carried along with the primary jet. The drawings show a great number of *different applications* and modifications illustrating this process.

Amongst the modifications are several examples of the application of a jet of falling water for inducing a current of air to mingle with it. A jet of steam is also shown for raising water.

The lengthy description and drawings are very suggestive; but the applications of the invention to ventilation are only specially mentioned with reference to the injection and "the "expulsion of gases existing in closed vessels or depths of the "earth;" to "draughting off vitiated air in habitations into "the furnace" used for heating them; or to "exhausting "dangerous gases from cellars, mines, and also gases resulting "from the discharge of fire-arms on board men-of-war."

The drawings show the sectional elevation of a house, with its first and second floors ventilated by a steam jet, placed at the bottom of a tube branching out into the side of the wall of the second story. Air from the outside is supplied through another pipe, with a branch opening outside, and three trumpet-mouthed orifices, two opening into the first floor, and one into the second. A small steam boiler supplies the steam jet, or a fan "ventilator" the air jet, if such is used.

For use in ventilating cellars, mines, and battle-ships reference is made to steam jets passing along several tubes, with their ends one within another. In one case the steam jet is also contained within a small spherical casing, with open tubular projections at each end, opening into another short length of tubing, the whole contained within a larger funnel. Two examples of this class are shown; one with the steam jet opening downwards, the other upwards.

The inventor proposes to propel ships by employing his combined steam and air jet for driving "the water back that has "penetrated into tubes horizontally placed." "When the mixed "air is used for blowing, the necessary air may be taken from the "hold, thus ventilating the same."

A "contrivance, used when it is desired to attract into a "chimney certain gases it is desired to get rid of," consists of a steam jet projecting into a bent pipe, with the horizontal bend open to the atmosphere and the vertical steam into the chimney.

The inventor considers that he can generate "a powerful "stream of attractive air by means of a ventilator" or rotating fan for producing an air jet; and that fans themselves can be propelled in the same way.

[Printed, 1s. 2d. Drawings.]

A.D. 1855, February 23.—N° 403.

BENNETT, NICHOLAS.—(*Provisional protection only.*)—Improvements in buildings for ventilating and other purposes. Sockets or plugs of metal are built into the brickwork on the outside of the building for the purpose of receiving the ends of scaffolding poles.

"And as regards that part of this invention which relates to "the ventilation of buildings, it consists in making the before-"mentioned plugs perforated, so as to allow atmospheric air to "pass through the same and circulate in the space between the "joists of the flooring and ceiling, thus rendering the before-"mentioned plugs and sockets available for the purposes of "ventilation."

[Printed, 4*d*. No Drawings.]

A.D. 1855, February 23.—N° 406.

LOOKER, BENJAMIN, junior.—"Improvements in ventilating "stables and other buildings."

"This invention consists of constructing clay or earthenware "or glass tubular apparatus to be let or built into walls, the air "being admitted from the exterior of the building into the "interior through numerous small openings, which, by prefer-"ence, are made in an inclined direction back towards the wall. "For this purpose a simple clay or earthenware or glass tube, or "a double earthenware or clay tube, is built horizontally in the "side or wall of a stable or building, and a second tube, closed "at its inner end, and perforated with numerous small holes, is "arranged to slide within the fixed tube, whether it be a single "or a double tube. In some cases where the quantity of openings "to admit air is to be constant, the perforated tube is fixed in the "wall."

[Printed, 8*d*. Drawing.]

A.D. 1855, February 28.—N° 446.

COOK, THOMAS.—Improvements in working punkas or fanners for ventilation.

The punkas are arranged parallel to each other in rows.

"All the punkas in each row I connect together by a hori-"*zontal rod, which* passes through mortices in the vertical rods

" by which the punkas are suspended, in such a manner that any " one punka may be detached from the others at pleasure without affecting their motion. These connecting rods are attached " to horizontal bars at each end of the room, which are themselves attached by ropes to a double drum-head or wheel, which " is worked by a lever in such a way, that when the lever moves " the bars are set in motion, and, as a consequence, all the four " four rows of punkas, and by a counterpoise-weight at the other " end of the lever, they are all brought back to their original " positions.

" In some cases I employ revolving fans to put the air in " motion."

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1855, March 19.—N° 614.

CRUDNER, Louis Henry, and KOEBRIG, Frederic Louis.—Improvements in ventilation.

" We construct a tube or funnel of any suitable material, " which we place in any convenient situation to form a communication between the interior of the apartment or otherwise and " the external atmosphere; and in connection with the said tube " or funnel we adjust a fan wheel or blower which we cause to " rotate through the intervention of any self-acting mechanism " or motive power hitherto in use for similar purposes."

[Printed, 6*d.* Drawing.]

A.D. 1855, March 20.—N° 624.

MARSDEN, Charles.—Improvements in ventilating tents.

" My invention consists in forming tent poles hollow, and in " perforating the sides or circumference thereof, or otherwise " making apertures therein to any extent that may be required, " whereby ventilation will be afforded to the inside of the tent. " Where necessary, I provide the means of closing temporarily " so much or so many of the apertures as may not be requisite " to afford the amount of ventilation desired."

[Printed, 6*d.* Drawing.]

A.D. 1855, March 22.—N° 631.

MILLER, William.—" My said invention relates to a system " *or mode of* insuring a suitable current up the chimneys or

" smoke flues of fire-places of the domestic or other kinds, " whereby the smoke from the fire is prevented from issuing into " the apartment in which the fire-place is situated, the ventilation " of the apartment being at the same time promoted by the " apparatus employed. This apparatus consists of a screw or " set of spiral or helical blades, which is made to revolve in the " upper part of the chimney or flue by means of an external vane " wheel, which is acted upon by any currents of air outside in the " manner of a horizontal windmill."

[Printed, 6*d*. Drawing.]

A.D. 1855, March 26.—N° 663.

McKINNELL, John.—Improvements in apparatus for ventilation.

"The apparatus consists essentially of two tubes, arranged " concentrically and opening at their lower ends into the space " or apartment to be ventilated. These tubes communicate with " the external atmosphere at different levels, the vitiated air " rising up the central tube and passing off at the higher level, " whilst the fresh air enters the annular passage between the inner " and outer tubes at a lower level, and descends into the space or " apartment below. Both passages are provided with suitable " valvular mechanism for regulating the currents, that of the " outer passage at the same time serving to deflect the downward " current of fresh air, and spread it out horizontally, so as to " prevent partial draughts."

[Printed, 10*d*. Drawing.]

A.D. 1855, March 26.—N° 665.

BARTLETT, William.—(*Provisional protection only*.)—"Im-" provements in ventilators."

"I provide myself with a suitable metal or wood frame of any " required shape or size, having a piece of tube soldered or secured " in its centre by means of a cross-bar, such tube being placed " at right angles to the plane of the frame. I next require a " bevelled or conical glass rim, circular, square, octagon, or any " other desirable shape, and which glass rim is secured to a ske-" leton frame, having a cross-bar and centre hole, and which hole " must be concentric with the hole in the tube before described; " and *these rims I* add in any desired number, putting them one

" on the other, the holes in the cross-bar of each succeeding " one being smaller and concentric with the tube or hole first " described; and over these rims I place a glass or other dome, " and which dome I secure to a pin having as many shoulders " on it as rims, and which pin is put through the tube, before " described, and through the cross-bars of each rim, and finally " secured to the dome, and the degree of ventilation required " is obtained by pushing the pin through the tube, lifting the " dome and rims in regular succession."

[Printed, 4*d*. No Drawings.]

A.D. 1855, March 31.—N° 720.

CORBITT, William.—" Improvements in warming and ventilating apartments."

"The actual fire-holding portion of the grate may be of any of " the well-known constructions, but behind the fire-brick back " and sides is formed an air-heating chamber of fire-brick or " iron, in communication with the outside of or any convenient " portion of the building, by a suitable cold air passage or passages. The admission of this cold air into the heating " chamber is regulated or controlled by means of a valve or " valves, which may be opened or closed by a rod or other suitable contrivance placed on one or both sides of the grate. The " air having been heated passes up behind the cheeks of the " grate or stove, an air passage or chamber being fitted thereon " for that purpose. One or more openings are made in the " upper part of the front or mouldings on the front of the grate " or stove, such openings or apertures communicating with the " hot air passages behind the cheeks." The "heated air will " thus emerge into the room."

[Printed, 10*d*. Drawing.]

A.D. 1855, April 7.—N° 773.

HULL, Joseph.—" Improvements in the machinery and apparatus for grinding corn." The furrows of a common pair of mill stones are set out in a peculiar way, whether the top or the bottom stone, or both stones, revolve. In combination with such stones is an exhaust fan, driven in the room above the stones, with the casing of which it is connected by a trunk. A flanged *collar is placed* around the inlet tube of the casing, working upon an iron ring or circular plate let in round the eye of the stone on its upper end. The heated air and stive, after having thus been exhausted, are driven into a chamber with canvas or wirework panels for the sides and roof. If an ordinary room be used it must be ventilated to let the air escape freely, after having been separated from the solid particles.

[Printed, 6*d*. Drawing.]

A.D. 1855, April 13.—N° 823.

TURNER, George.—Improvements in ventilating tents.

"To obtain ventilation, apertures are left in the top parts of " the coverings immediately round the uprights or supports, and " hoods or bonnets (made of metal or any other material) are " fitted to and slide on the uprights or supports immediately over " the apertures, so that the outlet may be increased or diminished " at pleasure."

[Printed, 8*d*. Drawing.]

A.D. 1855, April 30.—N° 965.

ACRES, Edward.—"Improvements in desiccating and cooling " atmospheric air, and the application thereof to useful purposes." An apparatus is described for thus treating air for drying or preserving grain or fish, or for introduction between the grinding surfaces of millstones.

In the case of grain, it is enclosed in a reservoir, and the air is supplied by one pipe and drawn out through another by means of an exhauster. Or it can be also introduced "into " the upper part of a drying kiln, with its agitating apparatus " similar to that described" in a previous patent of E. Acres, dated December 8th, 1854, "but without the heating apparatus " combined therewith."

The apparatus for heating and drying the air for afterwards cooling it consists of a stove set in brickwork, with air holes at its sides. The air to be heated enters through flues in front, at both sides, thence to the top of the fire-box, into a brick chamber for collecting it, whence it passes into the refrigerator. This is composed of an upper and lower water cistern, between which are arranged a series of water pipes, in order to at last so cool the air on its passage as to condense its moisture. These pipes are shewn triangular in cross-section.

[Printed, 6d. Drawing.]

A.D. 1855, May 15.—N° 1096.

CHRISTIE, Peter.—Improvements in ventilating tents. The tent is made with a floor raised about eighteen inches above the ground and formed of frames which, when turned up, form beds, and in their ordinary position carry bedding attached to them; the air passes freely through this space and keeps the bedding dry and also rises through the floor and ventilates the tent.

[Printed, 8*d*. Drawings.]

A.D. 1855, May 23.—N° 1159.

EDEN, James.—" An improved mode of drying grey, bleached, " finished, or dyed goods," applicable to the apparatus described in Specification No. 1945, A.D. 1854. Two distinct tall chambers are employed, through both of which the fabric is wound in a zig-zag fashion on two series of rollers placed at top and bottom.

Between each pair of the bottom rollers in the first chamber is a vertical steam chest, fitted with pipes for the inlet and outlet of the steam, and for the escape of the water of condensation. To the foundation plate of the first chamber, and underneath each roller, is fitted a flat tube, one end of which is bell-mouthed, while the top surface below the roller is perforated, for the admission of air from the outside. Or the lower side of each of the flat tubes may consist of a steam chest, constructed with several tubes passing up through it, like the tubes of a steam boiler. In this case the ends of such flat tubes are closed.

Into the second chamber cold air is injected through a grid by a fan, and escapes above, after passing between the fabric.

[Printed, 10*d*. Drawing.]

A.D. 1855, June 13.—N° 1351.

HENSON, Henry Henson.—(*Provisional protection only.*)—Improvements in ventilating buildings.

"My means of ventilating buildings consists in a hanging " valve or plate suspended from the top, and free to swing in a " suitable frame, in such manner that the wind drives the plate " back, closes entirely or partially an aperture in the opposite " side of the frame, and deflects the wind into the building to be " ventilated."

[Printed, 4d. No Drawings.]

A.D. 1855, June 19.—N° 1402.

JOHNSON, JOHN HENRY.—(*A communication from Jean Gustave de Coninck.*)—Improvements in ventilating grain when stored.

The granary is constructed with a number of floors, in which are made orifices, through which the grain falls from the top to the bottom floor, being raised up through a well in the centre. The orifices in the lower floors are larger than those above, and openings are made in the side walls through which the air is drawn by the rapid descent of the grain through the lower floors and ventilates the grain as its falls; the air may also be driven in by fans.

[Printed, 8*d*. Drawing.]

A.D. 1855, June 29.—N° 1489.

WEEMS, JOHN.—" Improvements in drying grain and other " substances," such as malt, by the use of heated air."

The grain or malt is laid out in a layer upon a horizontal perforated floor, and the heated air is forced through the perforations and the grain. The chamber containing the drying floor may be of a duplex cylindro-conoidal form. In the large inverted cone portion of the chamber, beneath the drying floor, is a collection of vertical tubes, opening at their lower ends into a wide air duct, leading from a blast fan or pump beneath. An air current can be directed up through the tubes and thence into the lower part of the drying chamber, which may be coned internally to direct the air through the grain on the perforated floor. The air tubes are themselves inclosed a vertical heating case, into the lower end of which steam is blown by a bottom side pipe, provision being made for the escape of the water of condensation and of the uncondensed vapor at the upper end. If high-pressure steam engines are used to drive the fan the waste steam is passed into the air tube case. A communication air duct passes down from the conical cover of the heating chamber to the fan, so that the heated air passed through the grain layer may be exhausted from the upper part of the drying chamber, and repassed by the fan action through the heating tubes and through the grain. The drying chamber may be so arranged as to be capable of continuous action without losing time in re-charging, by so forming the chamber that a freshly charged perforated floor may be passed into it just *as the one covered* with dried grain is removed. A little steam may be passed through the grain with the heated air. The heated air may be forced either upwards or downwards. Exhaustion may also be employed in forming a heated air current, instead of direct forcing.

The plan is shewn applied to a large grain store and drying kiln of the ordinary kind. Two air heating vessels, set in the ground floor, are employed, each of which consists of a cylinder containing a number of tubes, which communicate with a brickwork chamber built against the wall of the building, and supplied with air by a fan. Steam surrounds these air pipes; and the air thus heated is led into a long chamber extending under the kiln floor. This kiln floor is carried by cast-iron columns, connected by longitudinal beams, upon which are placed smaller transverse joists, then longitudinal bars, and, over all, a sheet of wire cloth. The air and moisture are conveyed away by ducts to the roof of the building. As they pass through the various storing floors, doors may be formed in them for supplying down the grain.

[Printed, 10*d*. Drawing.]

A.D. 1855, July 11.—Nº 1544.

PRATT, Henry. — (*Partly a communication from Edward Harrison.*)—Improvements in ventilating flour mills. The mill is constructed with a ventilating shaft, which passes from the basement through the centre of the building and stands up above the top; this shaft is built in compartments, some of which are made for the passage of smoke and some for the passage of air; the air is heated by passing through "surface condensers," which are heated by the exhaust steam from the engine, which is thereby condensed.

[Printed, 3*s*. 6*d*. Drawings.]

A.D. 1855, July 11.—Nº 1550.

COULSON, John.—Improvements in ventilating mines, &c. The apparatus by which the mine is ventilated consist of a reservoir of water from which the water falls through vertical tubes into a receiver below; glass or other pipes are fixed above the upper orifices of the vertical pipes, and stand above the upper surface of the water; the air is drawn down these pipes and descends with the water into the receiver, in the upper part of which it collects, and is conducted thence to the mine, or other place to be ventilated, by means of a pipe.

[Printed, 8*d*. Drawing.]

A.D. 1855, July 12.—Nº 1563.

SIMONS, Edward.—An "apparatus to be used for condensing "and absorbing the smoke and products of combustion arising "from gas and other flames, and increasing the illuminating "power of the said flames."

Instead of the ordinary bell glass usually supported over gas flames, a bell-shaped vessel is used, with its lower edge turned inwards and upwards. Within the annular vessel thus formed at the bottom of the bell cover is placed water, or potash, or soda, or carbonate of potash, or carbonate of soda, or solutions of potash or soda, or carbonate of potash or soda, or quick lime or slaked lime, or any other absorbent of carbonic acid gas. A series of holes are sometimes made in the vessel above the level of the chemical substance used. The gases from the flame return down the bell, and the carbonic acid gets absorbed by the chemical substances in the annular vessel. The bell is preferably made of glass or also of china or earthenware.

Several forms are shown. The turned up part of the vessel may be made a reflecting surface, and the reflectors may be so formed as to constitute an external lining to the turned up portion of the bell glass.

The reflector may have a convex figure projecting beyond the lower edge of the bell glass; the lower part may be made separate from the upper part; and they may be attached by the adjustment of their shapes, aided by set screws.

The holes above the chemical substance may be dispensed with; especially when the bottom part is separable from the upper.

When solid absorbents are used, the turned-in portion of the bell glass may be set in a horizontal plane.

Several slightly differing forms are shewn for employment in chandeliers.

[Printed, 8*d*. Drawings.]

A.D. 1855, July 17.—Nº 1601.

SALAVILLE, Scipion.—An improved apparatus for airing and *preserving grain*, seeds, fruits, &c.

"The apparatus is composed of a number of cylindrical tubes, " which I call 'generators;' they are made of sheet iron, and are " perforated with a great number of small triangular holes, " punched from the inside, so as to form a burr on the outside " like a rasp. The length and the number of these generators " will depend upon the dimensions of the building to which the " apparatus is to be applied. These generators are ranged parallel " to each other at a distance of about two feet, and are connected " together by parallel rows of smaller tubes perforated like the " others."

The grain, &c., being placed in contact with the "generator," the air rises through it from the apertures in the sides; a fan is employed to force in the air.

[Printed, 8*d*. Drawings.]

A.D. 1855, July 20.—N° 1646. (* *)

DESCHAMPS, CASIMIR, and VILCOQ, CHARLES.—" A free " diving boat."

This invention relates to a diving boat which may be freely directed backwards and forwards at the surface or at the bottom of the water, by means of a screw and a rudder, worked by hand, from within the boat. The operator can breathe, and remain under the water for several hours by the use of compressed air contained in reservoirs. This compressed air is diffused at will by means of a manometer in the boat, from which the assistant sucks it through a breathing apparatus, and then drives it out through a pipe. The operator can see the ground on which he works through the glass partition of the lantern; he is also allowed to grasp external objects by means of sleeves. He may cause the boat to rise up and float a little beneath the surface of the water, and may there regulate its buoyancy by means of two gutta-percha hoses or chambers, which are filled with compressed air when the boat is desired to rise, the air being let out when the boat is desired to sink. These two hoses are placed at the back and front parts of the boat in outside galleries, with nets for protecting the hoses, and for holding and carrying the working tools. There is also a water-tight chamber, which contains electric batteries for the purpose of feeding a lamp. It may be used for raising or destroying foundered vessels, for searching for fire ships and like incendiary engines, for reconnoitring, &c.

[Printed, 6d. Drawing.]

A.D. 1855, July 24.—N° 1683.

HUTHNANCE, Richard Polkinhorn.—"Improvements in "drying and in apparatus to be used therein." The drying room is heated by a furnace, and on each side of it is a door communicating with the adjoining room, and perforated at its lower part, which perforations are covered with a slide. In the ceiling or roof there is also fixed a ventilator of perforated zinc for getting rid of the vapours and improving the draught. The articles themselves are arranged on clothes horses and on portable wood rails reaching across the drying room from one horse to the other.

The whole room is heated by iron pipes leading from a furnace at one end of the room to a chimney at the other. A supply of hot water can be obtained by surrounding with a water casing the short length of flue communicating from the furnace to the iron pipes, which are themselves slightly inclined upwards to the chimney or vertical flue. They are also covered up with a platform of stone to prevent the articles getting burnt in case the pipes should be overheated. Besides the air inlets through the two side doors, there is a perforated plate, regulated by a vertical slide, and opening into the drying room through a passage above the furnace.

[Printed, 10*d*. Drawings.]

A.D. 1855, August 17.—N° 1868.

DANDURAN, Jean Jacques.—Improvements in providing air to diving apparatus. The apparatus consists of a bell, with which the diver is wholly or partially covered; the air is supplied by means of an "inverted syphon tube," provided with a mouthpiece in the lower part, the air passing up one leg and down the other, and the necessary direction being given it by means of a "ventilator."

[Printed, 6*d*. Drawing.]

A.D. 1855, August 20.—N° 1882.

JOURNEAUX, Francis.—"Improvements in drying wheat and "other grain." The grain, while in continual motion, is brought in contact with heated air for a determinable period of time.

The apparatus consists of a shaft containing several tall wire cases, oblong in cross section; heated air passing up in spaces left between them. The heat is supplied to the shaft from the hot air flue of an ordinary furnace. Bars of iron are placed across the breadth of the cases, to cause the grain in the centre to turn to the sides. The self-acting apparatus for discharging and regulating the discharge of the grain from the cases are placed at the lower end of each case. They consist of a set of ducts leading into a central passage, and so arranged as to cause the grain to pass from the bottom of each case in streams in an oblique direction from the sides into the central discharge pipe. The diameter of the oblique ducts becomes gradually smaller as it approaches the central discharge pipe. The length of time during which the grain remains in the case can be regulated by the diameter of the discharge passage. The grain to be dried is fed through a wire screen into a hopper at the top of each case. A cowl at the top of the shaft, and a damper in the flue from the furnace, regulate the draught, and a closed iron door at the bottom of the shaft prevents the inlet of any air except through the fire-place.

[Printed, 10*d*. Drawing.]

A.D. 1855, September 13.—N° 2070.

TUCK, JOSEPH HENRY.—(*A communication.*)—Improvements in supplying air to diving bells.

The variation in the relative density of the air contained in the working chamber of the bell and the water underneath it is compensated for by a drop weight and valve, adjustable from within the bell, and by means of passages for the exit of air at the bottom of the bell; or also by such passages used alone.

" The pump for supplying air to the bell or other vessel consists " of a chamber with a partition in it, terminating at the lower " part in an open cylinder, through which a piston is worked. On " each side of the said partition, at the upper part, are fitted two " valves, the one opening inwards and the other outwards. The " two latter valves are contained in a chamber, which is enclosed " in a jacket, kept cool by a constant supply of water. Through " the two former valves is supplied a sufficient quantity of water " to make up for waste in each stroke of the pump piston. By " this arrangement of the pump, cylinder, chambers, and valves, " the condensed air is cooled, as required, by the water surrounding " the valve chamber, and covering the eduction valves, and a " sufficient supply of water to make up for waste is maintained."

Other details of diving bells and of apparatus for working *below water* are also described.

[Printed, 1s. 4d. Drawings.]

A.D. 1855, September 27.—N° 2154.

ATKINSON, MATTHEW, and RIDGE, BENJAMIN.—Improvements in applying the heat of steam boilers to warming and ventilating, consisting—"in so constructing and arranging the boiler " and the pedestal or base on which it stands, that the atmospheric air shall pass through its centre between two water " chambers, and becoming heated pass off through an appropriate " outlet in the form of heated oxygen comparatively free from " carbon, and consequently well adapted for the purposes of " warming and ventilation, suitable arrangements being made " for regulating the velocity, temperature, density, or dryness " of the air, and by these means ensuring a continuous supply " of fresh air, which can be conveyed into buildings by wooden " conduits."

[Printed, 10*d*. Drawing.]

A.D. 1855, November 5.—N° 2486.

DEVAUX, ALEXANDER CHARLES LOUIS.—Improvements in granaries with a view to the ventilation of the grain.

"To this end, I propose to construct granaries with bins or " chambers of a depth, say, of thirty feet, more or less, which " I ventilate by means of air passages formed in the bottom or " sides of the bins, and communicating with a main flue, which " is supplied with air from suitable blowing apparatus, and by " means of endless chains of buckets and archimedean screws, I " distribute the grain into the bins and discharge it therefrom as " required."

[Printed, 1*s*. Drawings.]

A.D. 1855, December 31.—N° 2954.

SALTER, JOSEPH.—(*Provisional protection only.*)—"Improve-" ments in ventilating apartments."

" My improved apparatus for ventilating apartments consists " of a syphon, the longer leg of which reaches to near the top of " the apartment, and the shorter leg is placed so near to the fire-" place, that the heat thereof, by rarefying the air in the short " leg, causes the air from the upper part of the apartment to " descend the longer leg of the syphon, and thence up the " chimney."

[Printed, 4*d*. No Drawings.]

1856.

A.D. 1856, January 3.—Nº 28.

MARSDEN, Charles.—Improvements in ventilation.

" I carry my invention into effect by leading tubes, which may " be of different lengths, and of diameters increasing with their " lengths, into a sewer or other place to be ventilated, which tubes " open into various parts thereof, and at the other ends lead either " directly or through other tubes into a main shaft, having an " exit to the air, and provided with a fan or other contrivance for " producing a partial vacuum, by which means I withdraw " vitiated air and gases from all parts of the place to be ventilated, " through the tubes into the shaft, and thence into the outer " air."

[Printed, 8*d*. Drawing.]

A.D. 1856, January 4.—Nº 43.

CLARKE, William Saint Thomas.—(*Provisional protection only.*)

" This invention consists in effecting the ventilation of rooms " and other places, by the adaptation of apparatus consisting of " pipes, tubes, ventiducts, and reservoirs, (one, more, or all ' of them) communicating with the external atmosphere, such apparatus having sheets or plates of galvanised, aluminised, or " coated wire netting, or thin perforated metal, arranged so that " the air, vapour, &c., passing through the apparatus must " pass through such plates and be infinitely communicated or " divided."

[Printed, 4*d*. No Drawings.]

A.D. 1856, January 11.—Nº 85.

NEWTON, Alfred Vincent.—(*A communication.*)—Improvement in cooling and ventilating buildings for the purpose of preserving meats and other purposes, consisting in driving into the apartment required to be ventilated by means of a fan or other appliance a current of air which is directed through a chamber containing ice, so that it is thereby cooled and dried; *the ice chamber* is made to surround a chamber for preserving meats and the air passes from the outer to the inner chamber through openings in the walls.

[Printed, 6*d.* Drawing.]

A.D. 1856, January 15.—N° 110.

BAKEWELL, Thomas Hill.—Improvements in ventilating mines, buildings, ships, &c. The ventilation is effected "by the "united agency of these two powers, propulsion and exhaustion; "videlicet, by forcing air in, and drawing air out, by whatsoever "form of machine it may be accomplished." For the purpose of warming as well as ventilating buildings, &c., the air is drawn through pipes or a metal case heated from the outside.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1856, February 1.—N° 287.

MILLER, Benjamin Franklin.—"Improvements in venti-"lators for chimneys and other purposes."

The ventilator consists of a horizontal tube which is made to turn on the top of the chimney or air pipe, and is provided with a vane which keeps it directed to windward. It consists of a pipe to the end of which is attached by struts an "inverted truncated cone" and on the outer end of the cone is attached a short metal rim, to which again is attached by struts a second upright cone; in the middle space enclosed by the two cones is a closed box consisting of two cones united at their bases to a short central cylinder; the smoke or air is driven by the wind through the space between the struts.

[Printed, 6*d.* Drawing.]

A.D. 1856, March 1.—N° 527.

MILLER, Robert Frederick.—(*Provisional protection only.*) —"An improved omnibus." The inventor says that "the light-"ing and ventilation at the fore part of the vehicle" are improved, but does not state how this is to be done.

The ordinary seats and brackets are done away with, the bottom side of the body being made to form the seats. The passage along the centre is formed by carrying the woodwork down from the front part of the seats. The roof is raised in the centre to form a seat outside and carry the "rocker" down lower than usual. The fore part of the body is extended. The top ventilating rail and "mahogany" are done away with, and the glass is carried up to the framing. The pillars are carried down straight. The hind cross spring is done away with, and the front carriage is fitted with a double wheel plate, transom, &c. The rails are carried around and along the roof and bottom side of the same, and extra brass rods are fitted for hand holders.

[Printed 4*d*. No Drawings.]

A.D. 1856, March 13.—N° 614.

McCARTON, William.—(*Complete Specification, but no Letters Patent.*)—Improvements in the drying of corn and other grain for grinding and preserving." A tall tower-like wire or perforated metal case is placed within another, so as to form an annular space narrowing gradually from the top to the bottom, and supplied with grain from a hopper at the top. Such cases are placed within a hot air chamber communicating with a furnace, and with the eduction flues set in the centre of the cases, concentric with the hoppers at top. The hot air thus passes between the grain in the annular case and up the central flue. A fan may also "be used as an exhaust." Obstructions of metal are arranged in the cases to turn over the grain in its descent; and exit passages at the bottom communicate with a conduit for conveying the dried grain to a store.

[Printed, 6*d*. Drawing.]

A.D. 1856, March 20.—N° 665.

WADSWORTH, James.—(*Provisional protection only.*)—"Improvements in the ventilation of mines, consisting in removing the foul air from the mines by means of "a suitable pump, bellows, " or fan, mounted on wheels, adapted to the tramways laid down " to facilitate the removal of the minerals from the workings. " On the same wheels or frame are placed boxes or compartments " for stowing lengths of flexible pipe or hose to convey the gas " from its place of deposit to the pump or bellows, and thence to " the air grate."

[Printed, 4*d*. No Drawings.]

A.D. 1856, March 24.—N° 690.

HEATON, Thomas.—" Improvements in self-acting doors and *" gateways " for* ensuring efficient ventilation in mines.

"These doors are opened by the weight or pressure of the "horse, person, or material passing over the platform or apparatus, and closed immediately by self-acting counter-levers, "springs, weights, or other suitable means, thus effectually preventing the current of air being diverted from its proper course. "In mines I particularly recommend two sets of the said doors "and apparatus to be used, placed at such a distance from each "other that the first will be closed before the second is opened, "and thus secure a passage of pure air to the workings."

[Printed, 1*s.* 10*d.* Drawings.]

A.D. 1856, March 26.—Nº 726.

NEWTON, **William Edward**.—(*A communication.*)—"Improved apparatus for exploring under water."

The leading feature of the plan whereby such apparatus are supplied with air, consists in making the receptacles in which it is conducted and used sufficiently strong to resist the hydrostatic pressure of the water, and then simply allowing the air at atmospheric pressure to flow down from above, and the vitiated air to flow up from below through tubes, in order either to intermittently renew, or keep up a continuous supply.

A submarine boat is constructed of iron, with internal ribs, and of an egg shape, with pointed ends. At one end is a screw propeller driven by a crank from the inside, either by the crew or "by "a clock spring or electro-magnetic machine." At the bow is an up-and-down rudder, at the stern a common rudder. It has windows, and contains a lamp or Drummond light. "The boat, "which forms an air reservoir, should be made large in order to "contain air sufficient for several men to breathe as long as they "may require to be under water without opportunity to ventilate "it." The boat contains nearly sufficient ballast to sink it, and when the crew enter, they let in a quantity of water, by means of a force pump, by which water can also be ejected, so that the vessel can either be sunk or be raised for a fresh supply of air. This is obtained by means of a couple of vertical pipes, which are thrust up above the water, the vitiated air inside being pumped out. "Or the air may be purified" "by a small fountain of lime "water issuing in many jets to absorb carbonic acid gas, and the "issue from a meter of a small quantity of oxygen gas." The boat can also "be supplied with ventilating pipes reaching above "the surface, the circulation of the air being kept up" by "a "motion blower within the boat or above the water."

Or a cylindrical air reservoir, communicating by a couple of tubes with the ship above, and by other pairs of tubes with each diver, or also with a lamp, all on the bottom of the sea, may be used instead of the submarine boat.

The diver's apparatus consists of a strong helmet connected with the two ventilating pipes. One of them is connected with a blower or air pump for drawing out the air, the supply from the outside flowing in through the other pipe. "When the defensive "armour admits of the pipes being contained within the casing "which is round the body, the exhaust pipe should have a branch "extending downwards to abstract the carbonic acid gas." Lamps are kept alight below water in the same way. The drawings show a lamp attached to the head-piece of the diver, the air pipes of which are branches of his own breathing pipes. "The "inventor remarks that it is not in all cases necessary to have "an artificial draught in the breathing pipes. If they are made "thick and non-conducting, the warmth of the body of the diver, "and the heat given off by the lamp which he carries will make "a natural draught."

A flexible bag, to be inflated below water by means of gas, so as to raise sunken vessels, is also described.

[Printed, 10*d*. Drawings.]

A.D. 1856, March 29.—N° 753.

WILLIAMS, Charles Wye.—Improvements in ventilating steam vessels by means of rotating fans.

"I propose to ventilate the cabins, hold, and other places by "the exhaustion or propulsion of air in pipes or other air passages "circulating through different parts of vessels, providing such "suitable outlets or inlets, perforations, valves, or similar con"trivances as may be required. I also employ like mechanical "arrangements to exhaust the products of combustion from the "engine-boiler furnaces by the funnels, and thereby promote the "combustion of the fuel, or I sometimes cause the air to be "forced into the engine and stoke rooms, by which means the "furnaces will be better supplied with air."

[Printed, 4*d*. No Drawings.]

A.D. 1856, March 29.—N° 757.

POWELL, Robert.—(*Provisional protection only.*)—Improvement in ventilating wearing apparel, tents, and other articles made of textile fabrics.

" The ventilation of the article to be made is effected by punch-" ing or making holes in the material to be used in such part or " parts of the article to be made as perspiration or moisture is " most likely to accumulate, and protecting the holes so punched " or made either by stitching them round with thread, silk, or " cotton, or otherwise, by inserting brass or other metal oilet " holes, and in the outside of the article to be made; further " protecting the holes so punched or made from the admission of " wet or damp, by placing over them either a lapping seam, fold, " or a trimming of sufficient width to cover the holes so punched " or made."

[Printed, 4*d.* No Drawings.]

A.D. 1856, March 31.—N° 769.

HICKS, James.—" Improvements in stoves." One form consists in fitting " a hot chamber within the whole length of the " body of the stove. The fuel box is suspended in such a " manner in the centre of the outer case " that the air coming through an aperture in the base, passes up between the fuel box and outer case, discharging itself at the top, but having no communication with the escape pipe. To promote ventilation, a pipe must be attached, which may communicate with any outlet; also a hot-air elbow pipe may be used to convey hot air from one room to others, and by means of a ventilator at the top of the escape pipe the fire can be regulated.

In every form of these stoves a fire-box is employed to contain the fuel, which is put in and lighted at the top. " The box is " closed at the bottom to catch the ashes, but has air holes to " maintain combustion." The whole is surrounded with a casing provided with apertures for the air, and it is placed on a stand raised from the ground near a door or over a hole in the floor admitting fresh air. The external casing of this hot chamber is closed in at the top, except at an aperture for the passage of the escape pipe of the fire box. The top of the escape pipe is surrounded with a ventilator, and immediately below is a warm-air elbow pipe which may be passed through a wall for the conveyance of warm air. These stoves should not be used in close chambers without an escape pipe to carry off gases; or the stove itself should stand "so as to allow the fresh air elbow pipe to "throw hot air into the chamber," the escape pipe being so situated as to send the escaping products of combustion up the chimney.

[Printed, 4*d*. No Drawings.]

A.D. 1856, April 8.—N° 850.

DEVAUX, Alexander Charles Louis.—Improvements in ventilating grain in granaries.

"For this purpose I provide my granary with deep bins (of a "cylindrical form by preference) constructed of woven wire, or "articulated sheet metal, or other suitable material, supported "by a metal or other framing, and in the centre of each bin I fix "an air shaft for conducting streams of air or gaseous products "into the mass of grain contained in the bin. These several air "shafts I connect with a common flue which is supplied with air "or gases from suitable fans or blowers. For the purpose of "regulating the supply of air to the several bins, I provide "dampers for cutting off the supply from any bins in the series. "Instead of the air being forced into the bins, the fans may, if "preferred, be caused to act as exhausters."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1856, April 11.—N° 870.

FONTAINE MOREAU, Peter Armand le Comte de.—(*A communication.*)—Improvements in ventilating ships.

A straight trumpet-shaped tube is attached to a frame so that it can be sunk in the water and the water driven through it owing to the way of the ship; a small pipe enters this tube at the narrowest part, and communicates with the part of the ship to be ventilated. Owing to the vacuum produced the air is drawn through this tube and passes into the water.

[Printed, 10*d*. Drawings.]

A.D. 1856, April 19.—N° 944.

LONGBOTTOM, Abram. — (*Provisional protection only.*) — "*Improved means of* lighting and ventilating mines."

"The object of this invention is to generate illuminating gas "by the application of the heat derived from the fuel used in "creating a down draft to coal and other mines. For this purpose I introduce into the mine to be ventilated any suitable "arrangement of oil gas apparatus, preferring, however, to use "that which forms the subject of a Patent granted to me on the "13th September 1855; and this apparatus I set to work by "supplying the furnace with fuel, and the retort with oil or "melted fat. A draft proportionate to the amount of fuel consumed will thus be created, and the heat generated by the "burning fuel will heat the retort or retorts, and vaporize the "oil as it falls through from a reservoir. The resulting gas I "conduct by means of pipes into all parts of the mine requiring "illumination, and consume it in fixed burners."

[Printed, *4d.* No Drawings.]

A.D. 1856, April 21.—N° 952.

CHAMBOR, Joseph Auguste Marie Touët.—Improvements in ventilation.

"My invention refers, first, to closing the recess of a fire-place "by means of a plate of cast iron or other suitable metal, in the "manner of a register stove, but having three openings or air "passages in it, two in the upper part and one in the lower part "thereof. These openings are capable of being closed so as to "prevent the passage of external air from the front to the back "of the stove. On being opened these passages exhaust the "external air, that is, the air in the room or other space in "which the stove is placed, which, on finding an escape, will pass "rapidly up into the chimney, whereby a very effective draught "is obtained."

[Printed, *8d.* Drawing.]

A.D. 1856, April 23.—N° 970.

FORSTER, George.—Improvements in arranging the air-doors of mines to insure efficient ventilation.

"I arrange or place double doors at suitable distances apart in "the workings or passages, and so connected with each other, by "means of a connecting rod or bars combined with suitable levers, "that the opening of one door will necessarily close the other or "that next behind it." "The cases in which these doors are "hung or arranged are extended on the side opposite to the

" hinges in the form of the arc of the circle described by the
" swing of the door (which forms the radius) so as to keep the
" door almost air-tight whilst opening, and leaving only sufficient
" room for the wagon, &c. to pass."

[Printed, 10*d*. Drawing.]

A.D. 1856, May 8.—N° 1087.

DEVAUX, Alexander Charles Louis.—Improvements in the construction of granaries. The grain is stored in vertical bins which are made with perforated flat sides so as to fit into a small space and permit of the entrance of air; the spaces between them are closed at top, and air is drawn into them by a fan or by the draught of a furnace chimney; doors are made in the side of the bins at different heights so that they can be discharged from the top.

[Printed, 10*d*. Drawing.]

A.D. 1856, May 22.—N° 1218.

HUBERT, Alexandre.—"An improved apparatus for ventilating ships and vessels." The apparatus consists of an ordinary centrifugal fan driven by hand or other power, and placed in the hold or other part of the vessel, from which it draws the foul air and expels it by a vertical pipe which discharges it into the open air.

[Printed, 8*d*. Drawings.]

A.D. 1856, June 13.—N° 1404.

DE JONG, Servaas.—Improvements in warming and ventilating buildings.

" The air-heating apparatus and the passages for conducting
" the heated air are to be of clay or other material than iron, but
" for drying chambers iron may be used. From the air-heating
" chamber the warm air is conducted by a suitable channel or
" channels under the floor of the apartment to be warmed, in
" which floor there are to be valves or ventilators, through which
" the warm air rises into the apartment." "There are also other
" valves or ventilators in the floor of the apartment opening into
" other channels below the floor, and such valves or ventilators
" and channels are for the purpose of the air in the apartment
" *passing to the* ash-pit of the fire which heats the heating

" chamber." " In the ceiling of the apartment there are to be " other valves or ventilators leading into channels communicating " with the interior of the chimney.

[Printed, 1*s.* 10*d.* Drawings.]

A.D. 1856, June 18.—N° 1439.

GREEN, CHARLES EDMOND.—" Improvements in ventilating " tents, huts, and camp hospitals," consisting " in making, " framing, and covering my tents, huts, or camp hospitals in two " or more thicknesses, so devised as to allow a free current of hot " or cold air, as may be required, the materials used being singly " or severally linen, woollen, union, serge, skins, matting, oiled, " vulcanized, waterproof, or any other known fabrics, with metallic " slides for the purpose of thoroughly ventilating the interior."

[Printed, 4*d.* No Drawings.]

A.D. 1856, June 30.—N° 1530.

GOODE, SAMUEL JABEZ.—Improvements in ventilating buildings by the agency of gas burners. At the top of the building to be ventilated is placed a chamber on which is fitted a rotating cowl; in the lower part of this chamber are placed gas burners which can be raised or lowered as desired, and over each of which is placed a "funnel-shaped flue, the bottoms of the said flues " opening into the building and the tops of the said flues opening " into the chamber;" the air of the building is drawn up the last-mentioned flues and discharged through the cowl above.

[Printed, 8*d.* Drawing.]

A.D. 1856, July 17.—N° 1681.

BRAGG, HENRY, the younger.—" Improvements in drying air, " and in machinery for stretching, drying, and finishing fabrics."

Air is dried by passing it through tubes or chambers surrounded by cold water, or otherwise cooled, in order to condense the moisture. When the temperature of the air to be dried is very low, it is slightly warmed before passing it through the tubes or chambers. The exact way in which the air is to be thus treated is not described.

The main subject of this specification is a peculiar " compound " stenter frame, for stretching, drying, and finishing two or more

" pieces of fabric simultaneously." The stenter frame mainly consists of a long shaft to which are fixed four, more or less, sides or frames, forming as many compartments. The outer portions of these compartments are made of perforated sheet metal, with the smallest perforations at each end, whence they gradually increase in size towards the centre. Outside these inner compartments are placed, on rails, the pieces of fabric; each piece of which is contained in a space separate from the others. These spaces are formed in the casing in which the stenter frame turns by means of rollers on the prolongations of the partitions forming the whole frame. These outer spaces are supplied with moist, dry, or warm air as required; and, as the fans at both ends of the frame revolve, the air is either exhausted or forced through the fabrics. A mode of giving "the elastic finish;" of taking off and replacing the fabrics; and a traversing carriage for the attendants; are described and illustrated in the drawings, which should be consulted.

[Printed, 10*d*. Drawing.]

A.D. 1856, August 14.—N° 1896.

CHURCH, William, and HAMLYN, Henry Whiting.—Improvements in ventilating hay and other ricks, consisting in constructing a series of vertical and horizontal air-pipes or flues, round which the hay or other material is built so as to leave passages for air; the pipes may be made of wire gauze or perforated metal, and the horizontal pipes may be withdrawn after the rick is built; the vertical passages may be formed by means of poles which can be removed and a space thus left open.

[Printed, 6*d*. Drawing.]

A.D. 1856, August 23.—N° 1973.

WADSWORTH, James.—Improvement in ventilating mines, consisting "in conveying gas or fire-damp, 1. from the cavities " in which it accumulates into some adjacent air course by means " of pipes or tube leading from the former into the latter, and " through which the gas is drawn or forced by means of a fan, " bellows, or pump worked by manual or other power."

The pumping engine or fan is mounted so as to be portable and readily removed from one part of the mine to the other. The withdrawal of the gases may also be effected by the draught of a furnace or lamp applied at some suitable point.

2. "In removing gas or fire-damp from the workings of mines " by the combustion of a portion of such gas along with other " inflammable matter in suitably constructed furnaces or chambers, in such manner that the heat produced by the said combustion may create and maintain a current through pipes or " tubes leading from the reservoir or accumulation of gas to the " air course, and in a method of separating '*in transitu*' the " more inflammable portions of the fire-damp for the purpose of " such combustion."

[Printed, 1*s*. Drawing.]

A.D. 1856, September 20.—N° 2217.

BLACKWELL, Thomas Evans.

This invention relates to an "improved mode of constructing " fire and air flues or passages" in dwelling-houses, "offices, " and other buildings, the object being to improve the draft of " chimneys by preventing the accumulation of soot in the flues, " and to facilitate the ventilation of apartments.

"Instead of constructing the flues of ordinary bricks, or of " round or oval pipes built into brickwork as heretofore, I employ " hollow blocks of fire-clay moulded into a rectangular figure in " plan on the outside, and with the internal angles of the spaces " filled up. These blocks I so proportion that they will readily " bond with ordinary bricks, and prevent the necessity for filling " up spaces with bats and rubble when they are built up into " a wall."

[Printed, 6*d*. Drawing.]

A.D. 1856, September 23.—N° 2226.

BOYD, David Ogilvy.—(*Provisional protection only.*)—"This " invention has for its object an improved method of arranging " air flues to supply fresh air to, or withdraw vitiated air from " each of the rooms of a house, and the invention consists in " constructing the partition between two smoke flues of bricks " of clay, iron, or other material, having passages through them, " in such a manner that, when laid one on another, in building the partition, the passages in the bricks range, so as form " an air flue between the two smoke flues. The invention also " consists in the use of iron bricks having passages through " them for forming, as above described, air or smoke flues or " passages."

[Printed, 4d. No Drawings.]

A.D. 1856, September 29.—N° 2276.

BOYCOTT, Richard.—(*Provisional protection only.*)—Improve-
" ments in air-doors for mines, consisting in "constructing air-
" doors for underground workings so as to render them self-
" closing. For this purpose I construct the doors of an irregular
" square form, and by preference wider at the bottom than at the
" top, and I suspend them at any angle required, not being in
" any way confined as to detail of shape or angle so long as the
" principle involved be adhered to."

The back of the door where the hinges are attached, and also the frame to which it is hinged, are made inclined at an angle from the vertical, so that when the door is opened it is necessarily lifted and will fall back to the closed position by its own weight.

[Printed, 6*d*. Drawing.]

A.D. 1856, October 3.—N° 2320.

BOYD, David Ogilvy.— "The object of my invention is to
" facilitate the construction of air flues or passages to supply
" fresh air to, and withdraw vitiated air from the several rooms of
" houses. For these purposes, in place of separating the different
" flues of a stack by means of solid partitions of brick or other
" material, I form such partitions of hollow bricks of clay, iron,
" or other material, laid one upon the other in building the par-
" titions, so that the passages in the bricks range from top to
" bottom of the parts of the two flues which they divide."

[Printed, 8*d*. Drawing.]

A.D. 1856, October 8.—N° 2354.

BRADFORD, William.—" Improvements in the arrangement
" of gas burners for lighting and ventilating."

" My invention consists in a circular supply pipe which has
" short branch pipes of small diameter radiating from it at
" intervals about an inch (or more or less) apart all round; the
" end of each short branch pipe to which a burner is fixed is bent
" upwards, so that each burner is in a vertical position.

" The gas burner is suspended from the ceiling of the room,
" and under an opening, or the orifice of a pipe or channel for
" conveying away vitiated air and products of combustion;
" between the opening or orifice for ventilating, and the circular

" supply pipe of the gas burners, I place an ornamental conical " pipe, the smaller end of which rests on the circular pipe supplying the burners with gas; the sides of this conical pipe are " perforated with holes or slits. Below and from the centre of " the circular pipe supplying the burners a branch pipe descends, " having a rose or burner at the end of it drilled for a series of " horizontal gas jets. These jets are immediately under the " ornamental conical pipe, and create through it a strong " ascending current of air."

[Printed, 10*d*. Drawing.]

A.D. 1856, October 11.—N° 2386.

HEPPELL, George.—Improvements in ventilating mines, consisting "in forming the shaft with parallel sides in such manner " that the cage for the lift of the mineral or other matter may, " by fitting tightly, serve as a bucket. Such cage or bucket " being provided with a suitable valve or valves, which acting " with a valve or valves in the headway, become means in the " ascending motion of the cage of accumulating air in the shaft " to be forced into the various passages of the mine. By the " descent of the cage, or by reversing the positions of the valves, " the cage or bucket may be used as means for withdrawing the " impure air or gases."

[Printed, 2*s*. 2*d*. Drawings.]

A.D. 1856, October 17.—N° 2427.

DRAY, William.—Improvements in ventilating stacks of corn and other agricultural produce.

"One form of apparatus consists of one or more tubes, per- " forated or not, open at one or both ends, and fitted with a fan, " blower or other agent for creating a draft through the stack or " store; and, if desired, branch pipes, perforated or not, are con- " nected to the tubes.

"Another form of apparatus consists of a metal covering " placed over the stack, heap, or bundle, with pipes leading from " the outside thereof and entering the bottom and sides, or " either, of the stack, heap, or bundle." "Air or other purifying " agents forced or admitted into the pipes and drawn through " the stack by a blower or other equivalent, placed upon or con- " nected with an aperture in the top of the cover. Or where

" grain or other horticultural or agricultural produce is stored in " buildings, I introduce under the floor or floors thereof air pipes " or flues, and cause them to open at intervals into and through " the floor."

[Printed, 4*d*. No Drawings.]

A.D. 1856, October 20.—N° 2454.

YOUNG, James.—Improvements in ventilators to be applied to the ventilation of ships, &c., to prevent waves or other water from flowing down the tube. Within the upper extremity of the ventilating tube are fixed a number of curved plates which project inwards and upwards and catch any water which may enter the tube; the water flows down to the bottom of the curved plate and escapes through orifices there made in the tube.

[Printed, 8*d*. Drawing.]

A.D. 1856, November 1.—N° 2574.

CURTIS, William Joseph.—" Improvements in lighting and " ventilating railway carriages."

" In order to improve the ventilation of the carriage, the lamp " is caused to take its air from the interior of the carriage, and " for this purpose a ring of wire gauze or perforated metal is introduced in connection with the glass globe, and in the roof of " the carriage a box or case is opened, to put the lamp into the " opening through the roof, and it is then closed by a lid; from " this box a tube runs along the roof of the carriage, and on the " ends of the tubes are cowls, which turn in the opposite direction to that in which the carriage is running, and thus a partial " vacuum is produced in the box or case, and the ventilation of " the carriage and the burning of the lamp are improved."

[Printed, 10*d*. Drawing.]

A.D. 1856, November 3.—N° 2583.

KIRKHAM, John.—(*Provisional protection only.*) — Improvements in the ventilation of retort houses and other buildings.

" I cause the roofs and upper windows or openings in walls to " be closed and made air tight. The fresh atmospheric air will " flow into the building by the lower windows, doorways, or other " openings, and press the smoke and all other gaseous vapors " *upwards* under the roof, from whence the smoke and vapors are

" drawn down through pipes, trunks, or brick shafts, either of " which is carried up under the roof to within a suitable distance " from the upper part, and the top of such pipes or trunks is to " be opened out into a hopper or bell-mouthed shape. The smoke " and gaseous vapors are drawn down and through pipes or other " channels," to and through a close condensing chamber by a revolving fan or other exhausting machine.

[Printed, 4*d*. No Drawings.]

A.D. 1856, November 6.—Nº 2612.

HUNTER, COLIN. — (*Provisional protection only.*) — Improvements in heating, drying, and ventilating. The heating and drying are conducted in a chamber or oven into which hot air is admitted through a number of apertures in the roof or ceiling from a duct supplied with hot air from a coil of pipes heated by a furnace; the air as it becomes cooled by contact with the articles to be heated sinks to the floor and is conveyed away through other passages at the opposite corner to that at which it is admitted; a fan may be employed to drive in the air.

" The same procedure and general arrangement of apparatus " are also applicable for warming and ventilating rooms, the " heated air being always supplied to the upper part of the rooms, " and the cooled and vitiated air taken away near the floor.

" Where apartments are to be cooled, a cooling chamber, such " as a well or an ice-house " " may be employed instead of the " heating furnace."

[Printed, 4*d*. No Drawings.]

A.D. 1856, November 6.—Nº 2615.

WEBSTER, JAMES.—" A new or improved instrument or apparatus for transmitting hydrostatic and pneumatic pressure, " which said instrument or apparatus is applicable to pressure " guages, safety valves, thermometers, pumps, and other like " machines." Its special application in ventilation is " to the " opening and closing of windows or valves of hot-houses, con" servatories, or rooms, where the temperature of the same rises " above or falls below the desired point."

A vertical cylinder, containing water, is connected with an india-rubber tube, closed at its upper end, surrounded by a helical spring, and linked to a chain or a rod. The india-rubber tube stretches under the internal pressure, and the rising or falling of the rod to which it is attached, effects the opening or the closing of the windows or valves.

[Printed, 10d. Drawing.]

A.D. 1856, November 13.—N° 2673.

TREEBY, Thomas Wright Gardener.—(*Provisional protection only.*)—"Forming sewers or tunnels, and gulleys to sewers." An invert is laid down which, if made of cast iron, has iron rails cast longitudinally on the invert. If of other material, a railway is made so as to take away the earth. On the rails is "a centre "framed, so that as the earth is taken away the centre can be "moved forward to keep up the earth and allow the brickwork to "be proceeded with." In the invert are hollow tubes running longitudinally, formed so as to allow air to be driven through the sewer. The air is to be "sent through the sewer or tunnel, so as "to have a fresh current continually passing up and driving the "foul air back." Where it is intended to lift the earth out of the shaft a small engine working a blast blower such as are used for blast furnaces is employed. The work is commenced at the lowest level so as it proceeds, "the incline which is given to "cause a proper fall of the sewage, will allow the whole of the "working to be kept dry." A gulley sluice-tap is used for carrying off the surface drainage. The new pipes are formed with longitudinal joints as well as the common transverse joints that are now used so that the pipes may be taken through the sewer or tunnel in separate parts, and afterwards put together.

[Printed, 4d. No Drawings.]

A.D. 1856, November 15.—N° 2706.

BILLING, John.—Improvements in chimney tops for ventilating flues, &c.

"In constructing a stack of chimneys I make the top of each "chimney of a conical or pyramidal form of straight or curved "contour, with or without a level or inclined base or surface on "each side of the top of the stack. A vertical partition is placed "between each chimney top to prevent the smoke from one "chimney descending into an adjoining one."

These partitions stand up a considerable distance above the tops of the flues so as to form a shelter from the wind.

[*Printed, 6d.* Drawing.]

A.D. 1856, November 21.—N° 2757.

CLARE, John William.—"Improvements in preventing, re-"moving, consuming, and condensing smoke and noxious "vapours, and in apparatus for those purposes." They are applicable to "the noxious vapours given off by crowded as-"semblies of persons in theatres or hospitals, by "chemical or "other operations," and to sewers.

Reciprocating exhaust pumps or fans are employed to extract the vapours and then propel them either simply into the atmosphere, or "into a furnace or through pipes or retorts heated by a furnace, "or through vessels containing lime or lime water," or water merely. The outlet main, where the air is to be propelled through a liquid opens into a vertical pipe covered by an inverted bell immersed in the water. The bottom edge of the bell reaches below a couple of wire gauze diaphragms. The pistons of the single acting pumps are to be "driven by a train of wheels, and "a weight or spring," or by a system of weights, pullies, and cords by which the pumps can be driven "by a weight or by "power at pleasure."

[Printed, 10*d*. Drawing.]

A.D. 1856, December 13.—N° 2967.

WADSWORTH, James.—(*Provisional protection only.*)—"Certain improvements in heating and ventilating apartments, "buildings, and ships, and in apparatus applicable to and to be "used for such purposes."

The apartment to be heated is supplied with air passed through a stove consisting of an external air chamber, having its outlet opening into the apartment, surrounding an inner chamber or tubes, in which the gas or other combustible is to be burnt. The temperature of the air passing into the room is thus raised by contact with the heated surface of the inner chamber or tubes. The outlet of the latter conveys the products of combustion away from the apartment, and air is admitted, to support combustion, through adjustable valves.

For ventilating apartments this stove is placed in communication with the air occupying the upper part of the room, on the one hand, and with the external atmosphere, on the other, by means of pipes. The draught caused by the heat conveys the vitiated air away.

If heat and ventilation are required conjointly, the inner or combustion chamber are placed only in communication with the upper part of the room, using the air derived therefrom for the purpose of supporting combustion, and leaving the external chamber to furnish a supply of warm air.

[Printed, 4*d*. No Drawings.]

A.D. 1856, December 27.—No. 3081.

SWAIN, WILLIAM.—" Improvements in heating and venti-" lating." A tubular chamber is placed at the back of the grate by which the room is heated; the products of combustion pass through the tubes and the air flows in contact with the outside of them and is delivered at the upper ends into the room. The warm and vitiated air is conveyed from the top of the room to perforations at the back of the grate " so as to promote combus-" tion and prevent the formation of smoke." Tubular chambers, such as fixed behind the grate, are generally used for supplying hot air.

Printed, 1*s*. 2*d*. Drawings.]

1857.

A.D. 1857, January 1.—N° 13.

LAWRANCE, WILLIAM.—(*Provisional protection only*.)—" My " invention consists in covering the top of a chimney shaft, " pipe, or flue with a conical deflector or plate having an orifice " in the centre thereof, and in connecting to the chimney shaft, " pipe, or flue, a cylinder or piece of pipe open at top and bottom " in such manner that the lower end of the cylinder shall descend " below the level of the top of or opening in the conical deflector. " A pipe covered with the deflector and fitted with the cylinder " forms a ventilator, which can be fixed over apertures made in " the roofs of churches and other buildings."

[Printed, 4*d*. No Drawings.]

A.D. 1857, January 6.—N° 55.

COOK, CHARLES.—(*Provisional protection only*.)—An improved apparatus for ventilating chimneys and apartments.

"It consists of a kind of fan or series of blades placed in a can " or cylinder forming the top of the chimney. These blades are " placed on a vertical spindle supported in a step on a cross bar " at the bottom, and above by a cross bar at the top of the can, " beyond which it projects. The fan blades are inclined to their " axis, and when caused to rotate in the proper direction throw " a current of air upwards, and thereby produce a draught in the " chimney."

"To produce the rotation of the fan, I place a fan-wheel on " the top of the spindle, which wheel is exposed to the action of " the wind."

"With this apparatus, if used for the purposes of ventilation " in a chimney, I prefer to close the opening at the grate and " establish a communication with the chimney near the upper " part of the chamber to be ventilated."

[Printed, 4*d*. No Drawings.]

A.D. 1857, January 28.—N° 248.

COOKE, THOMAS.—" My invention of improvements in omnibus " ventilators and the apparatus for actuating the same, consists " in disposing ventilators immediately under the roof seat of the " omnibus, with suitable openings formed in the riser on each " side of that seat to permit free ingress or egress of air. The " ventilators consist of two flaps or valves placed longitudinally " and extending to the length of the raised space or recess in " the roof of the omnibus under the seat."

"The ventilators are actuated through the intervention of two " vertical screws, which rise midway of their length."

[Printed, 10*d*. Drawing.]

A.D. 1857, January 31.—N° 293.

COOPER, DANIEL, HEATON, THOMAS WOOD, and LANGSHAW, THOMAS LEE.—(*Provisional protection only.*)—Improvements in ventilation. The hot air is drawn off from the ceiling of the room or roof of the building to be ventilated by means of a fan.

"The fan is constructed of a series of vanes placed at suitable " angles of inclination, to allow of the exit of the heated foul air, " steam, vapor, &c., and is mounted upon and attached to a " vertical spindle, the bearing point of which is supported in a " glass or other anti-friction step-piece, the whole being enclosed " and *revolving within* a cylinder casing, the upper part (or that

" next to or in communication with the outside of the building) " being open."

[Printed, 4*d.* No Drawings.]

A.D. 1857, February 11.—N° 445.

COOKE, William.—Improvements in ventilators. A ventilator for windows is formed of a number of plates, or strips of wire-gauze or perforated plate, hinged together, the upper one being attached to the frame of the window, and the lower to the top of the sash, or to a sliding plate in the sash, so that they can be let down so as to cover the space left open by lowering the sash or plate, or raised and closed at the top of the sash when it is shut. In some cases louvre plates are employed, and the openings lined with wire gauze. A plate hung on pivots and carrying gauze side pieces is in some cases inserted in an opening in the window for ventilation; several such plates connected by a parallel movement may be employed.

[Printed, 10*d.* Drawing.]

A.D. 1857, February 23.—N° 528.

KIRKHAM, John.—Improvements in ventilating retort houses and other buildings.

"In order to collect the gases, I cause the roofs and upper " windows or openings in the walls of the buildings in which the " smoke or gases are evolved to be closed and made air-tight, so " as to prevent the vapors, smoke, or gases from passing off " except through the proper channel; the fresh atmospheric air " will flow into the building by the lower windows, doorways, or " other openings, and press the smoke and all other gaseous " vapors upwards under the roof, from whence the smoke and " vapors are drawn or conducted through pipes, trunks, or " channels into a brick shaft, which is carried up from the " ground to a suitable distance above the upper part of the roof."

"The draught is produced by a revolving fan or other suitable " exhausting machine."

[Printed, 2*s.* 2*d.* Drawings.]

A.D. 1857, February 25.—N° 551.

PIAUD, Laurent.—(*Provisional protection only.*)—Improvements in ventilating mines. Air is forced into the mine by means of a pump placed in the shaft.

"At the lower part of the feed pipe is a branch pipe or channel, " which enters a chamber containing a fan or ventilator, which " revolves in the direction given to it by the air from the pump, " and thus forces the air into another chamber by means of a con- " necting pipe. The latter chamber is also supplied with a re- " volving fan or ventilator, which compels the air to enter through " an opening into a circular or other shaped gallery extending " round the mine. This gallery communicates with several other " intersecting galleries, provided with doors, if necessary. The " deleterious gases, after passing through chambers containing " fans or ventilators of the same construction as those already " described, but moving in an opposite direction, enter an exhaust " pipe placed in the shaft by the side of the feed pipe. The ex- " haust pipe may be furnished with a valve, through which passes " the inflammable gas, which may be preserved for lighting pur- " poses."

[Printed, 4*d*. No Drawings.]

A.D. 1857, February 26.—N° 563.

EDWARDS, David Owen.—(*Provisional protection only.*)—Improvements in ventilation.

"Fresh air from the outside of the building is brought into the " private apartment or public hall through a finely-perforated " gauze-like partition, moveable or not, as may be required, co- " extensive with the whole or with part of the ceiling of the room, " and spread horizontally a little below the ceiling, a shallow " space is thus included between this partition and the ceiling, " and which communicates with the open air by means of ample " horizontal slits or oblong apertures made in the outer walls, " and fitted with valves, which by a simple arrangement are mad " to open and shut to any degree." The air so admitted escapes up "the chimney."

[Printed, 4*d*. No Drawings.]

A.D. 1857, March 2.—N° 604. (* *)

JONES, Edwin Francis.—"Improvements in the manufac- " ture of pig and bar iron." "A mode of heating the blast em- " ployed in smelting and other furnaces, which can also be " applied to the heating of air for other purposes where hot air " is required, as, for example, in the warming and ventilating of " *buildings.*"

"The improvements consist in heating the air between two " concentric pipes, which are placed over a suitable furnace, and " so set as to admit of the heat and flames playing first round the " outside of the outer pipe or ring and then passing by suitable " flues or passages into the interior of the inner ring or pipe, " whence they pass off to the chimney." The external pipes fit into annular sockets, which are bolted to flanges on the inner pipes ; by these means expansion is permitted.

[Printed, 10*d*. Drawing.]

A.D. 1857, March 16.—Nº 740.

MOES, Jules.—" Improvements in warming and ventilating." The foul air is withdrawn from the upper part of the room, and the fresh air supplied at the lower part by pipes, with the aid of revolving fans. The fresh air pipe may be put in communication with a coil of pipe heated by a furnace, or the air may be drawn over an endless web, which passes over rollers and dips in a trough of cold water so as to be thereby cooled. For ventilating railway carriages, the fan may be put in motion by an endless cord passing round a pulley on the axle.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1857, March 17.—Nº 744. (* *)

ASKEW, Charles, ASKEW, John, and MYERS, Henry.— " Improvements in hydraulic and refrigerating apparatus for the " purpose of raising sunken vessels, anchors, and all other sub- " merged bodies with light and other certain apparatus used for " the same purposes." The invention " consists of a mode of " arranging hydraulic lifts or pulls, which are placed together " with air pumps on a vessel or vessels or other floating bodies, " and are fixed to such vessel or vessels at the head or stern, or " such other convenient part of such floating body or bodies " found to be necessary." Powerful screw clutches or claws are attached to the keel of the sunken vessel, to which are connected suspension chains and hook fastenings, and like proper gearing, and which are so arranged as to be acted upon by the hydraulic piston lever, rod, or rods. Common egg-end boilers or flanged tubes are attached to the sunken vessel, or submerged body, for *lightening it*. These air vessels are worked from a floating raft or frame, to which are also connected a signal bell, whistle, and lamp, communicating by means of a screw valve air tube with the helmet of the diver, and a safety diving cage, fitted with proper piping, stop-cocks, &c., for the purpose of keeping up a constant communication between the floating vessel or other body, and the workmen or divers. "The air pumps supplying the egg-end "tubes or boilers are constructed with a refrigerator or refrigerators surrounding the same to keep the pumps cool whilst in "active operation."

[Printed, 1s. 9d. Drawings.]

A.D. 1857, March 17.—N° 746.

REMFREY, George Farrell.—Improvements in giving motion to punkas for ventilating apartments. To a driving wheel is geared a second wheel, which carries a series of projecting pins, so arranged that an upper and lower pin engage alternately with two pallets fixed angularly on a vertical shaft or axis, from which there is a projecting horizontal lever; this lever takes into a fork attached to the axis on which the punkas oscillate, and motion is thereby given them.

[Printed, 10d. Drawings.]

A.D. 1857, March 19.—N° 774.

MELLIER, Marie Amedie Charles.—"Improvements in "desiccating or drying paper and other goods in process of "manufacture." The drying chamber employed is closed except at apertures for the admission and exit of air, which may be at the lower and upper parts of the chamber; the air entering at the lower part and escaping at the top. In order to produce a current of air through the chamber, the escape aperture is connected with a chimney shaft. The eduction aperture of the chamber is either directly connected with this shaft, "or by preference with the ash-"pit of the furnace in connection" therewith; "at the same time "enclosing the ash-pit to prevent or regulate the admission of air "otherwise to the furnace." The air may be heated by passing it through pipes carried through a steam or hot water chest, or through an ordinary oven. In addition to heating the air it is passed over or through a bed of chloride of calcium, in order to dry it.

[Printed, 4d. No Drawings.]

A.D. 1857, March 30.—N° 879.

JOHNSON, John Henry.—(*A communication from Daniel Leasure.*)—Improvements in warming and ventilating. The air for ventilating the apartment is heated by being passed through a casing surrounding the stove; from thence it is conveyed by a pipe to the upper part of the apartment. The foul air is carried off by a pipe, which enters the stove at the ash pit and passes into the smoke flue.

[Printed, 8*d*. Drawing.]

A.D. 1857, April 13.—N° 1041.

READING, Daniel.—(*Provisional protection only.*)—"My in-" vention, which has for its object the ventilating of rooms or " apartments, and increasing the draft in flues or fire-places " thereby, with a view to prevent the downward passage of the " smoke into the apartment, as also to assist combustion in " the fire-place, consists in forming a communicating passage " (through the medium of pipes or otherwise) between the apart-" ment to be ventilated and the flue or fire-place of the room " above it, whereby the vitiated or impure air is carried away " from the apartment and passed either above or below the fire, " as may be required, for increasing the draft or assisting the " combustion."

[Printed, 4*d*. No Drawings.]

A.D. 1857, April 16.—N° 1081. (* *)

HANDS, Johnson.—" Improvements in kilns and in furnaces " and flues for withdrawing air and vapours from drying and " other chambers."

"The products of combustion from the furnaces, after passing " through the chamber of the kilns, pass into the flue at the top, " which communicates with and circulates through the drying " chambers, and then returns from the drying chambers to the " kiln, each return flue being formed into two branches which " conduct the products of combustion into the flues formed " between each of the furnaces; and I prefer to construct such " flues of iron, or partly of iron, leaving slits or openings for the " passage of flame from the furnaces into the flues, in order to " *ignite the products* of combustion in their passage through the

" flues to the chimney." Openings are also made in the flues where they pass through the kilns, for the purpose of drawing the air out of the kiln into the flues. Air heated by contact with the furnace is conveyed into the kilns.

[Printed, 2*s.* 2*d.* Drawings.]

A.D. 1857, April 21.—N° 1125.

COLLADON, Daniel.—(*Letters Patent void for want of Final Specification.*)—"The improvements in ventilating the places " where cutting machinery worked by compressed air is employed, " consist in arranging the pipes which convey the compressed air " to the cutting machines in such a manner that the compressed " air may be heated by a furnace, or cooled by any suitable " means, in order that the air after it has been employed for " moving the cutting machines, may be at a suitable temperature " for ventilating or changing the air wherever such machines are " being used."

[Printed, 4*d.* No Drawings.]

A.D. 1857, April 30.—N° 1221.

POWERS, George.—Improvements in ventilating ships. Air is admitted through a "scuttle" fixed in the side of the ship, and consisting of a fixed circular frame against which revolves a second which turns on a pivot passing through the centre of both; each is divided into four parts, two of which are glazed and two open, and by turning the moveable frame the open spaces can be made to correspond more or less so as to admit any desired amount of air.

[Printed, 8*d.* Drawing.]

A.D. 1857, May 4.—N° 1256.

LESLIE, John.—"This invention has for its object improve- " ments in apparatus for ventilating buildings. For these pur- " poses an air shaft is fixed to the ceiling or upper part of a " building in such manner as to rise through the roof, and on the " exterior of the air shaft is formed an enclosed chamber, open at " bottom and closed at top, by which combination of parts the " heated atmosphere of the building will enter the enclosed " *chamber around* the air shaft and keep it warm, and will thus

" induce a rising current through the air shaft. The entrance " into the air shaft and surrounding chamber may be made ornamental when desired."

[Printed, *4d.* No Drawings.]

A.D. 1857, May 4.—N° 1263.

HEYWOOD, Bennett Johns.—(*Provisional protection only.*)— " An improved construction of self-closing valve, and means for " rendering the same applicable for supplying or discharging air " water, and other fluids." It relates to the disc valve patented January 16th 1856. The valve is moulded of vulcanized india-rubber, of a dished or cup shape, with a flange around it. It is made "thick at its middle and gradually thinner towards the " sides, and across the valve" is "cut a slit for the passage of " the fluid." In order to open it to discharge water periodically from a cistern, "the tail end of a rock lever (which carries at its " other end a float)" is made to press on its under side and force it open. "When this pressure of the lever is removed, the elasticity of the valve will cause it to close." For admitting air to and retaining it in a cushion or flexible vessel, the valve is merely placed over the opening for the air. When the cushions or air vessel is drawn out the pressure of the atmosphere will force open the valve. To discharge the air, the valve is forced open by the pressure of the finger. This form of valve may be used as a stopper for bottles containing effervescing drinks, and also as a ventilator.

[Printed, *4d.* No Drawings.]

A.D. 1857, May 9.—N° 1308.

HEPPELL, George.—Improvements in ventilating mines, consisting, firstly, in drawing the foul air out of the mine by means of a large double-acting pump working in two shafts sunk near the up-cast shaft and communicating with it some distance below the surface ; secondly, where furnaces are employed, by enclosing the furnace within a vertical chimney so that the gases of the mine do not pass through it, for this purpose a chimney is constructed in the centre of the up-cast shaft and the air from the mine being heated by contact with the chimney, flows through the annular space which surrounds it.

[*Printed, 10d.* Drawing.]

A.D. 1857, May 16.—N° 1391.

OGLE, Nathaniel.—(*Provisional protection only.*)—"An im-"proved method of propelling and ventilating ships."

"My invention consists in the employment of air engines or "pumps as intermediate agents between a steam engine or other "prime mover when the propellors consist of pistons working in "a tube or cylinder open to the water. By this arrangement I "also ventilate the ship, as fresh supplies of air are continually "drawn down to the air engines or pumps while the propelling "apparatus is in operation."

[Printed, 4*d*. No Drawings.]

A.D. 1857, May 22.—N° 1449.

ENGLEDUE, John Ralph, and CULLIS, William.—(*Provisional protection only.*)—"We construct a frame or frames made "of wood or other suitable material, provided with pieces of "metal or other suitable material so curved or bent that when "the series is mounted in the frame or frames the surface shall "present risings and depressions, the whole being fitted together "so as to admit of being regulated so as not to allow of seeing "from the one side of the frame anything on the other side thereof, "and yet to allow spaces for the supply of air, which can be "regulated to meet the requirements of the case, and be capable "of closing entirely, or opening merely one-half of the framed "space for direct communication."

[Printed, 4*d*. Woodcuts.]

A.D. 1857, May 23.—N° 1456.

TRAVIS, Edwin, and CASARTELLI, Joseph Louis.—"An "improved apparatus for regulating the supply and discharge of "steam, air, water, and other fluids." Amongst a number of other uses, it is to be applied "to pipes and vessels for warming "or heating private or public buildings, churches, mills or warehouses, "and for ventilating mines," as also "to cylinders and "vessels used for drying yarns, fabrics, or fibrous materials in "the process of manufacture, or in finishing, drying, and printing "the same, and in the manufacture of paper, felt, and other "substances."

A box is fitted with a sliding tube at one end and an adjusting plug or piston at the other, with an escape hole at the side. This apparatus is fixed to the end of an additional pipe, which is attached to the ordinary pipe or vessel on which it is intended to act. This additional pipe has given to it a compensating arrangement with a bend, coil, or elastic disc, or a separate spring, so as to act when the pressure of the fluid being conveyed exceeds a certain amount. The adjusting plug or piston may also have a spring applied to it, in order, if necessary, to compensate for any additional expansion after it has been adjusted.

When an elastic disc is used for compensation, it is held between flanges forming the box which carries the end of the pipe to which the sliding tube is attached.

[Printed, 1*s*. Drawings.]

A.D. 1857, May 23.—Nº 1457.

RANKIN, John.—(*Provisional protection only.*)—" Improve-" ments in ventilators."

" I make a frame of tin or other suitable metal or material the " size of the frame in the sash where a pane of glass is fixed; to " each side of this metal frame I fix a number of small grooved " frames or holders, which work on centres, or pins, into each of " these grooved frames I slide a strip of glass, and I have a " vertical lever, to which I connect each of the grooved frames " or holders, so that when the said vertical lever is pulled down " it opens all the slides or plates of glass at the same time, and " when the lever is released, they close by means of a spring of " india-rubber or other elastic material."

[Printed, 6*d*. Drawing.]

A.D. 1857, June 5.—Nº 1582.

WHEELHOUSE, Thomas, and GREENWOOD, John.—" Improvements in ventilating carriages."

" We place or fix a fan under or upon the carriage to be acted " upon, or motion given to, by the revolution of the wheels in " motion; to provide for the outlet or inlet of air from the said " fan, we attach a tube or tubes of any suitable metal or material " to surround the vehicle or carriage, either inside, outside, or " both, as may be found desirable; the terminus of the said tube " or tubes to be at any convenient position of the carriage for " escape of the air. At or adjacent to each individual seat of

" the carriage we may introduce a hole or slot in the tube or tubes,
" with a cover or slide to be opened or closed."

[Printed, 4*d*. No Drawings.]

1857, June 9.—N° 1617.

HALE, THOMAS.—(*A communication from John Sawyer.*)—Improvements in warming and ventilating. At the lowest story of the building to be ventilated is placed a stove which is surrounded by an air chamber through which the air flows upward to a "ventilating chamber," which may be placed in any room requiring ventilation; to this chamber are attached, at top and bottom, two pipes which serve to allow the air to pass from it into the apartment and back again to be conveyed to the chimney.

[Printed, 10*d*. Drawing.]

A.D. 1857, June 11.—N° 1642.

PAULE, JOSEPH MICHELL.—" This invention has for its object improved means for ventilating coal and other mines.
For this purpose at the lower part of an upcast shaft, a closed
" furnace is constructed, and above the furnace is constructed
" an enclosed chamber, from the upper part of which a suitable
" chimney rises up the upcast shaft. Through the enclosed
" chamber are fixed numerous pipes. The air from the mine
" is conducted to the enclosed space, into which the ends of
" all the pipes come; hence, as the pipes become heated by
" the fire in the furnace, the air in the pipes becomes heated
" and flows quickly through the pipes and thence up the upcast
" shaft, further quantities of air passing from the mine to the
" pipes as the heated air passes off. The fire in the furnace is
" supplied with air by means of separate air conduits or passages
" from those which conduct the air of the mine to the system
" of heated pipes."

[Printed, 10*d*. Drawing.]

A.D. 1857, June 15.—N° 1667.

HEATON, THOMAS.—Improvements in self-acting doors for air ways in mines. The doors are made to slide upon rails so as to be drawn back into recesses when the wagons, &c., pass, and are closed by weights or by the inclined direction of the rails on which they run; they are opened by bent levers which take at one end into apertures made in the doors furnished with friction rollers, and at the other are placed so that the wagon strikes against them laterally and so opens the door.

[Printed, 1*s.* 6*d.* Drawings.]

A.D. 1857, June 19.—N° 1720.

RENNIE, ROBERT.—(*Letters Patent void for want of final Specification.*) — " Improvements in self-acting trap-doors for " mines." To the back of the door behind the hinge is attached a projecting piece which is jointed to two connecting rods hinged at their other extremities to two levers which oscillate on vertical pivots placed at some distance from the door on each side, and which are connected by diagonal rods so as to move in opposite directions only; on the inner ends of these levers are pendent catches against one of which the wagon strikes as it approaches the door, and moving the lever opens the door till it reaches the second catch, and through its agency closes the door. For the passage of long trains of wagons the levers are connected to rocking shafts placed at some distance from the door, and so arranged as not to be actuated by the approaching wagons, but to effect the closing of the doors by the wagons after passing the door.

[Printed, 4*d.* No Drawings.]

A.D. 1857, July 7.—N° 1875.

ALISON, JOHN. — " Improvements in preparing vegetable " substances for feeding animals, and in apparatus for that " purpose."

Grass, clover, tares, and corn may be carted directly from the field to a building, in order to be at once converted into chaff. The vegetable substance is fed from the ground floor of the building down to the cutting apparatus beneath, in order to be cut up into short lengths. Two forms of such machines are shewn. After having been thus treated, it is taken up by a series of endless buckets to the upper floor of the building, which consists of a number of perforated flaps, resting on an open framework, and turning on pivots. A revolving spreader distributes the grass evenly over the floor, and dry hot air is then admitted below it by air flues. On its passing through the grass, it escapes through chimneys into the external atmosphere. The blowers are then opened, and the dry chaff falls down along a shoot to a point whence it is taken by an endless chain of buckets into a store in the upper part of the building.

Another form of drying kiln is shewn. A cylindrical chamber has openings at its upper and lower ends for the reception and discharge of the cut grass. On being closed, hot air is forced up it, and thence, if necessary, conducted into an exhausting apparatus. When the grass is dried, a door at the bottom is opened, and the chaff falls down into a shoot, in order to be conveyed away, as in the previous instance.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1857, July 9.—Nº 1913.

DELMAS, Florentin.—(*Provisional protection only.*)—"Improvements in ventilating ships, mines, and other places." They are stated to be "applicable for the transport of grain, " colonial produce, and any merchandise subject to fermentation " and spontaneous combustion," and for the ventilation of " granaries, interiors of ships, mines, barracks, hospitals, &c. &c."

In the case of a ship, in order to utilise its motion "across the " column of air to which it gives an impulse," its interior is " furnished with pipes pierced with holes. These pipes are " adapted to receivers placed in communication with the exterior column of air, "and each receiver by the forward motion itself of " the ship receives a column of air, which is carried and distri- " tributed in the interior of the pipes." All these pipes communicate with openings at the stem for the escape of unhealthy air. The pipes may be fixed and of metal or moveable and of elastic substance, or of metal and moveable by combining them with elastic material, and they may be arranged so that the several ramifications pass through the bulk of the merchandise. Pipes thus placed, serve for airing the holds or other parts of ships stationed at port. The receivers are then turned to the wind.

For granaries or stores, on shore, the moveable receivers are furnished with a weathercock which, by turning to the wind, of itself will present the approach for the air. "The aperture for " the exit of air and gases is in this case furnished with two hoods " or covers, one above the other, the upper one forms a shelter " from the rain, and the other" serves as a flange at the extremity of the outlet pipe.

"For airing cavities and dwellings the inlet pipe may stop at " the ceiling or at the top, and the outlet sucker" "descend to " the floor."

"The apparatus may also be utilised in order to produce the " ventilation and draught of chimnies so as to prevent down " draught. For this purpose" three parallel hoods "may be " used, the highest serving as a protection from the rain, and the " two others as collars or flanges." "The extremities of the " tubes may be furnished with convex surfaces having the form " of a watering-pot rose."

[Printed, 4*d*. No Drawings.]

A.D. 1857, July 29.—Nº 2064.

SIEMENS, Charles William.—(*Provisional protection only.*) —"Improvements in refrigerating and producing ice, and in " apparatus or machinery for that purpose," "by the expansion " of air or elastic fluids."

The air is first compressed in a pump, by which its temperature is raised; it is cooled while in the compressed state, and then allowed to expand in an engine by which its temperature is lowered. The air thus cooled is brought in contact with the articles to be cooled or frozen, and is then conducted through " an interchanger," "by which it is made to cool the compressed " air which enters the interchanger in the opposite direction. " The pump for compressing the air is worked" by steam power, and the engine in which the air expands is made to assist in working the pump. The steam engine, the air engine, and the pump are preferably connected to the same rod or moving part, so as to transmit the power directly from one to the other.

The engine is immersed in brine, or a solution of chloride of calcium or other fluid "which will not congeal at the temperature " which it is required to produce." The air, after expanding in the engine, passes into a series of tubes immersed in the brine or other fluid. These tubes are perforated on their under sides, so that the air passes through the brine in a multitude of streams or bubbles; "or the air is admitted into a casing surrounding " the brine vessel, and allowed to pass through perforations in " the sides. The vessel which contains the brine is covered, and " the cold air is conveyed from it through the interchanger, " which consists of a series of tubes enclosed in a case. The cold

" air is conveyed through the tubes, while the compressed air " passes in a contrary direction through the case, or vice versa." " The water or other liquids or articles to be cooled or frozen are " immersed in the aforesaid brine or other fluid; thus the heat " which is continually abstracted from the articles to be cooled " or frozen is carried off by the heated air. This current of " heated air may be allowed to escape into the atmosphere." Or two or more regenerators or respirators, filled with wire gauze or metallic plates, " may be employed alternately for the compressed " and expanded air. The water or other liquid to be cooled or " frozen may also be conducted through tubes in the interchanger " or exposed to the contact of the cold air."

" When it is required to supply cold air to a cellar or chamber " of any sort, the cold expanded air is conducted into such " chamber, and on leaving the chamber it passes through the " interchanger as before."

[Printed, 4*d*. No Drawings.]

A.D. 1857, July 29.—N° 2065.

BERTWISTLE, John, and BERTWISTLE, Daniel.—(*Provisional protection only.*)—" Improvements in ventilating."

" In performing our invention we prefer to admit the fresh air " through a suitably perforated window cell, or at any convenient " place near the floor of the room or building, and to allow the " vitiated air to escape through a perforated plate or opening near " the ceiling or upper portion of the room or building to be " ventilated. By this means a constant circulation is kept up. " The openings for the ingress and egress of air may be partially " closed by wire gauze or other means, and dampers or shutters " are applied to close the openings when required."

[Printed, 4*d*. No. Drawings.]

A.D. 1857, August 20.—N° 2211.

GEDGE, John.—(*A communication from Xavier Lorentz.*)—(*Provisional protection only.*)—Improvements in ventilating buildings.

" I propose to build a house or group of houses or other building " or buildings with only one chimney or shaft, all flues, air " vents, and other conduits passing to and centering in this one " central shaft, which from its elevation will act as a powerful " tube for carrying off all the emanations which saturate the air

" in inhabited places, staircases, cellars, or passages; also causing " a powerful draught (to be regulated) for all fire-places, and " securing the greatest possible amount of caloric for warming " the apartments. In barracks, prisons, and similar buildings, " this shaft may also form the well of the grand staircase for all " the different floors, and also serve as a water conduit to all the " rooms of other places, or of throwing in a large supply of water " in case of fire."

[Printed, 4*d.* No Drawings.]

A.D. 1857, September 8.—N° 2345.

HOWARD, WILLIAM.—(*Provisional protection only.*)—Improvements in supplying air. The air is supplied by pipes which enter the building at the roof, and are furnished with branch pipes for distributing the air; these branch pipes may be furnished with mouth-pieces, and the air may be "medicated" for the use of sick persons; a fan may be used for injecting the air.

[Printed, 4*d.* No Drawings.]

A.D. 1857, September 10.—N° 2362.

HARRISON, JAMES.—"Improvements in apparatus for pro- " ducing cold by the evaporation of volatile liquids in vacuo." They relate to an ice-making machine, which may incidentally be used "for the supply of cool air to houses, hospitals, &c.," and " for regulating the temperature of apartments." It is a so-called ether machine, in which the abstraction of heat is performed by causing ether to rapidly evaporate under a diminution of the pressure of the atmosphere. "The ether or other volatile liquid " occupies the interim spaces" between the tubes of a sort of tubular boiler, the air to be cooled being conducted through the tubes. Or, "for regulating the temperature of apartments," water cooled in the same way is conveyed through pipes traversing them.

A double-acting pump is employed to withdraw the vapour of ether from the tubular boiler and to force it into a condenser where, by means of the pressure produced by the pump, aided by a current of cold water, the vapour is again reduced to the liquid state, in order to be returned to the boiler, where it is again evaporated and withdrawn by the exhaust action of the pump. When ice is to be made, the cold thus produced is utilized by passing a stream of saline or alkaline solution both outside the boiler and between the tubes, and thence along the outer surface of the vessels containing the water to be frozen, whence it is again returned to the boiler. A special form of refrigerator is described for smaller forms of machines for making ice, consisting of a series of vertical plates separated by wires. The drawings should be consulted for the details of the machine.

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1857, September 18.—N° 2419.

IMHOF, Daniel.— Improvements in bellows for ventilating mines and buildings and other purposes.

" My improvements in machinery for exhausting and forcing " of air, gases, or vapour, consist of certain contrivances in the " arrangement and disposition of the moveable parts of bellowses " so as to be double-acting when in motion, and so combine one " or more of these bellowses, working them each at different " periods of time, that the pallets or valves in the whole combi- " nation or series of bellowses may be taking in and letting out " air, gases, or vapour alternately, thereby causing a steady stream " or current."

" Another important improvement consists in arranging the " pallets and pallet boxes of such bellowses at one end, and free " from the moveable parts of the bellowses, not to have holes in " the bottom and top boards. There is another novelty and im- " provement in the arrangement of the several bellowses which is " to work by cranks and connecting rods centrally between each " series, producing a regular and steady alternating motion."

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1857, September 29.—N° 2501.

BROOMAN, Richard Archibald.—(*A communication from M. Trautmann.*)—(*Provisional protection only.*)— Improvements in the ventilation and working of mines. Pipes similar to those made use of in atmospheric railways are fitted in the shafts of the mine and, the air being exhausted from them by steam engines or other means from the top, moveable pistons formed so as to carry the minerals, &c., from the mine, rise from the bottom to the top of the tubes, while the foul air from the mine rushes in to fill the vacuum, and the mine is thus ventilated.

[Printed, 4*d.* No Drawings.]

A.D. 1857, October 1.—N° 2522.

JENNINGS, Josiah George.— Improvements in the construction of air passages for buildings. Air passages are formed by means of hollow bricks laid under the floors; under the earth are laid hollow blocks of earthenware, which also form passages for the air, from which the air passes through cast metal "trim-" mers" and hollow blocks at the back of the fire. "To ensure " good joints, the ends of the blocks are formed with grooves to " receive tongues." Blocks of clay are forced through dies so as to form a large central orifice and four corner orifices through them; when the blocks are laid together, the central apertures form a smoke and the corner ones air flues; they may be also formed in pieces.

[Printed, 10*d*. Drawing.]

A.D. 1857, October 10.—N° 2596.

MILLER, George.—(*Provisional protection only.*)

" The nature of my invention consists in an improved appa-" ratus for heating, and in so arranging the air passages in " combination therewith, that the room or building in which the " heating apparatus is placed is effectually ventilated. The fire-" grate of the heating apparatus is capable of being closed all " round, so that the air to keep up combustion enters below the " grate; the products of combustion are conveyed into a dome or " chamber, and then pass downwards to the off-pipe, and into the " flue or chimney. The dampers or valves for regulating the " escape of the smoke and the admission of air are so arranged " that when the supply of air is shut off from the fire grate the " passage to the flue or chimney is enlarged, thereby increasing " the ventilation."

[Printed, 4*d*. No Drawings.]

A.D. 1857, October 10.—N° 2604. (* *)

BUTLER, Frederick Mortimer. — (*Provisional protection only.*)—" Improvements in ventilators or wind guards for chim-" neys and other purposes."

" On the top of the flue or space to be ventilated I place a " pipe or trunk, and have an annular base flange around the " outside of said pipe or trunk a short distance below the top of " the same, and on this annular base flange I place vertical radial "guards (say six in number), extending rather more above than "below the top of the pipe or trunk, and the inner and upper "ends of these vertical radial guards sustain a disc that is above "the upper end of the pipe or trunk. An outer guard surrounds "the said vertical radial guards, and its lower edge is on the line "of the top of the pipe or trunk, and the upper end of said "outer guard is contracted so as to have an opening of the same "size as the vertical pipe or trunk."

[Printed, 4*d*. No Drawings.]

A.D. 1857, October 14.—N° 2631.

PARKER, Joseph.—Improvements in "working Venetian and "other similar blinds used as ventilators or screens, or both," consisting in "fitting the plates or louvres composing the blinds "in pairs or double sets in a frame, which is acted upon from the "side or other convenient part of the blind, and by the moving "of which both sets of plates or louvres are wholly or partially "opened or closed to the extent desired."

[Printed, 6*d*. Drawing.]

A.D. 1857, October 14.—N° 2632.

PLOMLEY, John Croft.—"An improved method of drying "malt, hops, and other produce." The goods to be dried are placed on the perforated floor, forming the ceiling of a building having an inclined roof, at the top of which is a cowl, and on the ground floor of which are fire-places. One of these fire-places is in the centre, below the floor; and others are placed at the sides, underneath a partition round the drying chamber in front of the wall. The fire-gases from the central fire-place rise directly up through the perforated floor; those from the side fire-places up between the wall and the partition. They are thence deflected down upon the goods to be dried on the perforated floor.

[Printed, 6*d*. Drawing.]

A.D. 1857, October 15.—N° 2634.

WILKINS, Edward.—Improvements in ventilating "frames "for horticultural and vegetative purposes."

"My invention consists in making frames or boxes (for cul"tivating plants) of glass, iron, wood or other material, with "small *openings* or perforations at the lower part thereof, and in

" suspending such frames or boxes within an outer frame or " casing, so as to form or leave a space or enclosure for the circulation of air or vapour either cold or artificially heated " around such inner frames or boxes."

[Printed, 4*d*. No Drawings.]

A.D. 1857, October 28.—N° 2727.

ADDISON, JOHN.—Improvements in discovering and removing hydrogen and other inflammable gases in mines. The presence of the gas is ascertained by the rising or falling of small balloons inflated with light gas, and which may be attached by silk threads at intervals to a wire which extends through the workings. The gases are removed by exploding them by means of an electric spark, with the aid of gunpowder if necessary, or by means of a rocket which runs on a wire through the workings with or without the aid of gunpowder. A safety chamber ventilated by a pipe from the shaft is formed for the use of the men and horses.

[Printed, 4*d*. No Drawings.]

A.D. 1857, November 16.—N° 2875. (* *)

TAYLOR, JAMES.—" Improvements in dredging machines, which " improvements are also applicable to other purposes."

" This invention relates to a novel arrangement of machinery " for the purpose of working dredging apparatus and other " machinery for clearing channel ways, and also apparatus for " examining, surveying, and operating upon submerged surfaces " and objects, and consists in applying an arrangement of direct " acting double cylinder steam engines to the roller or drum " placed at the head or top end of the dredging ladder, by which " the dredger may be caused to rotate or revolve at pleasure, and " thus supersede the use of intermediate shafting and gearing."

" For working submarine apparatus as for supplying air to a " diving bell, and for raising and lowering the same, I employ " direct acting engines combined with crabbed gearing and " pumps."

[Printed, 10*d*. Drawing.]

A.D. 1857, November 19.—N° 2914.

KEIGHTLEY, BENJAMIN.—(*Provisional protection only.*)—An " *apparatus for* indicating and registering" the " supply of air

" to mines, and other places requiring ventilation," consists of a case provided with a dial and pointers, with a vane pendulum suspended from the interior. The upper part of the pendulum rod is formed with a toothed piece in gear, with a pinion to which one of the pointers is attached. Another pointer carrying a stud and intended to register any variation of the supply of air, is lodged in a socket. It may be moved by hand to any position of the pendulum, and is held by a spring. " Should the current " of air be varied, this registering pointer will be moved by " the movement of the pendulum, so as to denote the altered " amount of air admitted, and will remain so until reset." Or there may be two similar registering pointers, one on each side of and acted on by the movement of the pendulum, so that one will register the highest and the other the smallest quantity of air admitted. The timepiece may be so adapted to the apparatus as to be capable of being stopped by a contrivance on the upper part of the pendulum. The dial is divided into degrees, corresponding with the dimension of the vane, and which is preferably formed of a metal frame, covered with oil silk impervious to air. The case can be locked. Supposing it be desired to register any reduction from the supply of air determined on for the ventilation of a mine, the pendulum pointer working with the pendulum will indicate the greatest force of the current; by its elevation the registering pointer is set in proper position to correspond with the situation of the pendulum. Should the current be varied, the pendulum will come in contact with the stud on the registering pointer, and cause it to travel backward on the dial. so as to register the lowest amount of air supplied.

[Printed, 4*d*. No Drawings.]

A.D. 1857, December 21.—N° 3130.

RENNIE, ROBERT.—(*Provisional protection only.*)—" Improve" ments in self-acting trap doors for mines." To the back of the door behind the hinge is attached a projecting piece which is jointed to two connecting rods hinged at their other extremities to two levers which oscillate on vertical pivots placed at some distance from the door on each side, and which are connected by diagonal rods so as to move in opposite directions only; on the inner ends of these levers are pendant catches against one of which the wagon strikes as it approaches the door, and moving the lever opens the door till it reaches the second catch, and through its agency closes the door. For the passage of long trains of wagons the levers are connected to rocking shafts placed at some distance from the doors, and so arranged as not to be actuated by the approaching wagons, but to effect the closing of the doors by the wagons after passing the door.

[Printed, 4*d.* No Drawings.]

1858.

A.D. 1858, January 4.—Nº 11.

TILLAM, EDMOND THOMAS.—(*Provisional protection only.*)—
" Improvements in apparatus for ventilating buildings."

" Where a gas burner or a gas stove is employed in order to " carry off noxious and deleterious vapours, an outlet pipe or " passage is used at or near the upper part of the room or building " to be ventilated. Into the outlet pipe or passage the heated " product of each gas burner is conducted by means of an inverted conical passage placed over the burner and connected " above to the outlet passage or pipe. In order to insure a free " current from the room or building outwards through the outlet " passage or pipe, steam is conducted by a suitable pipe into that " passage, near to its outer end, and such steam is generated by " the heat of one or more of the gas burners."

[Printed, 4*d.* No Drawings.]

A.D. 1858, January 13.—Nº 52.

MUIR, GEORGE WALKER.—Improvements in ventilating pipes.

" The shafts by which I effect ventilation may be square, " round, polygonal, or otherwise in their section, and are formed " double, that is, one within the diameter or circumference of the " other. The outer shaft is divided vertically into compartments, " but the inner is not generally so divided. The compartments " of the outer shaft may be used for either inward or outward " currents, but the inner shaft I prefer to be used for outward " currents only. The compartments are at their lower parts, or " their entrance into the place to be ventilated, by preference " turned into a horizontal direction, or parallel to the roof or

" ceiling, so that when fresh air is entering by any of them it may " not pass down in a direct line, but will be reflected horizontally, " whereby the force with which it enters is spent, and the air " being cool sinks down by its superior gravity."

[Printed, 10*d.* Drawing.]

A.D. 1858, January 28.—N° 154.

SPENCE, WILLIAM.—(*A communication.*)—Improvements in " pots for chimneys and ventilation," consisting in " providing " the pot with an upper or outer lip or cup projecting above and " at a small distance from the inner or ordinary shaft, and placing " around or externally to such inner shaft a space or a series of " spaces, so situate in reference to an inclined surface below that " the wind or external current of the atmosphere will be deflected " upwards, and make an upward current through these spaces, " and counteract the tendency to a downward current which such " wind would otherwise produce at the mouth of the inner shaft " if not protected, and thus aid the up current of the inner or " ordinary shaft."

[Printed, 6*d.* Drawing.]

A.D. 1858, February 26.—N° 384.

CHADWICK, WILLIAM.—" Improvements in ventilators."

" My invention of improvements in ventilators consists in an " improved mode of construction and applying revolving spiral " vanes or worms to the chimneys, flues or roofs of dwelling " houses, churches, chapels, manufactories, ships, and railway " carriages, or other buildings, for the purpose of improving the " ventilation thereof."

These vanes are acted on by the wind so as to revolve, and their revolution effects the exhaustion of the air from the pipe to which they are attached.

[Printed, 6*d.* Drawing.]

A.D. 1858, March 8.—N° 470.

DOULTON, HENRY.—" This invention has for its object im- " provements in the manufacture of smoke and air flues. For " these purposes the parts of flues are manufactured by expressing " suitable clay or brick earth through dies, in order to produce

" peculiarly formed blocks suitable for building smoke and air " flues, and for working in with ordinary brick-work. Through " each block there is a passage for forming part of a smoke flue, " which may be of a cylindrical, elliptical, or other suitable " section, and is of a size corresponding with the size of flue " desired to be made thereby. Each block has also a narrow " passage through it in order to produce an air flue following the " line of the smoke flue."

[Printed, 6*d*. Drawing.]

A.D. 1858, March 13.—N° 509.

CARTER, George.—(*Provisional protection only.*)—" Improve- " ments in steam engines and machinery for propelling vessels " and other bodies in water, and other purposes," amongst which " is exhausting air for ventilation. The drawing shows a pair of double gasometer air pumps, consisting of a pair of cylinders, each with their annular intermediate space filled with mercury into which dips an " inner double cylinder." The pair of pumps thus formed are worked by a vibrating crosshead in the same way as ordinary hand fire engines.

[Printed, 6*d*. Drawing.]

A.D. 1858, March 15.—N° 531.

D'ARGY, Edmond Armand Louis.—An improved hydraulic blowing engine, stated to be applicable, amongst many other purposes, to ventilation. This engine consists of a revolving cylinder carrying a number of curved arms which are hollow and communicate with the interior of the cylinder; the whole revolves in a cistern of water, and as it revolves the open end of the arms enter the water, which forces the contained air through the hollow axis; the water passes off along with the air till it reaches the cistern, into which it falls and from whence it flows back to the wheel.

[Printed, 8*d*. Drawing.]

A.D. 1858, March 17.—N° 545.

HINE, Thomas Chambers.—Improvements in heating and ventilating by means of gas. " For these purposes I use a series " of horizontal flames of gas produced by ordinary union, jet, or " bat-wing burners attached to a ring in a horizontal position, and " over this ring I place a dome of glass or other translucent

" material (of somewhat larger diameter than the ring), from the " summit of which passes a pipe, through which the products of " combustion are conveyed out of the room to a chimney or some " other convenient place. The lower part of this dome may be " closed by a disc of glass, which may be connected to the dome " by a metal rim, the disc of glass or the metal rim being suffi- " ciently perforated for the admission of air from the room for " supporting combustion and carrying on ventilation. On the " outside of the horizontal portion of the combustion or ven- " tilating pipe I use another pipe of larger diameter, and through " the annular space between these two pipes fresh air is conducted " into the room."

[Printed, 6*d*. Drawing.]

On the 17th February, 1859, the patentee filed a Memorandum of Alteration to the Specification of the above invention, for the purpose of correcting an error in the Drawing.

[Printed, 6*d*. Drawing.]

A.D. 1858, March 29.—N° 660.

CHADWICK, WILLIAM.—Improvements in the hoods or tops of ventilators.

"The hoods or tops of ventilators have hitherto been made " with vertical and radial vanes, against which the wind acts to " turn them round. Now my invention consists in making such " vanes in diagonal and slanting directions, so that the current of " air or smoke, in passing through the ventilator, imparts a rotary " motion to the hood or top, and therefore not only increases the " effective action thereof, but when the same is applied to a " chimney, prevents the accumulation of soot in the ventilator " and in the flue or chimney."

[Printed, 8*d*. Drawing.]

A.D. 1858, April 7.—N° 740.

SIBILLE, ETIENNE PIERRE.—"A new apparatus for warming " or cooling atmospheric air, water," and other liquids.

The apparatus consists of an annular casing, combined with a double-action air pump, which is preferably connected "with " an opening in the sash of a window;" a second opening being made higher so as to establish a current of air. Within this casing are placed two parallel serpentine tubes, under which are tubular hoops. The air to be heated or cooled is forced through the two parallel serpentine pipes, which are joined together at their upper ends. The tubular hoops below them are pierced with holes, which serve as gas burners to heat the air during its passage. To cool the current of air, the serpentine tubes are "enveloped in "sponge, upon which ice is placed," or they are moistened with cold water.

At the top of this apparatus, and communicating with the serpentine tubes, is a vessel containing water, a small quantity of which is allowed to flow into the serpentines before pumping the air through, which thus gets moistened.

With large apparatus, two separate casings are preferably used, one for the production of heat, and the other "for producing "coolness."

In the absence of gas, the "steam of spirits of wine," vaporised in a small boiler, at the bottom of the apparatus, and heated by a lamp, is used. Or a charcoal or coke stove is "placed beneath "the box with a circular chimney enveloping the serpentines." The drawings of this so-called "frigocaloritic apparatus" which is also intended to be used for heating or cooling water, should be consulted.

[Printed, 10*d*. Drawing.]

A.D. 1858, April 10.—N° 775.

BRUN, Pierre.—(*A communication from François Maniguet.*)—Improvements in fans for ventilation and other purposes. The fan consists of a cylindrical case through the centre of which passes a shaft which carries a number of radial vanes made concave on the foremost side so as more effectually to catch the air; on the shaft is a screw which takes into a toothed wheel by which it is to receive motion; the air is admitted round the axis and escapes through a pipe placed tangentially at the circumference of the cylinder. Amongst other purposes specified these fans are applied to stoves or furnaces for the purposes of warming and ventilating apartments, churches, and large establishments generally, as well as smaller establishments, as drying rooms, &c.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1858, April 19.—N° 853.

HOWARTH, James.—(*Provisional protection only.*)—"Improved apparatus to facilitate the discharge of smoke," also "*applicable for* the ventilation of buildings."

"The apparatus consists in an exterior can or casing of metal, " within which is supported a central vertical rod or spindle, " upon the upper extremity of which is placed a cap (forming a " cover to such casing), which may either be conically-shaped or " otherwise, and having curved or spiral openings at the sides for " the discharge or emission of smoke when employed at the top " of a chimney for such purposes. Upon this central spindle, " and within the said casing, at a point about the middle of its " length, a conical and spirally leaved vane is placed, and kept " in constant rotation by the ascending current, and is also so " arranged as to admit of the passage of the smoke or current " of air in an upward direction, but to prevent its return or " downward passage by its continual rotation in the same direc- " tion." The action may be reversed so as to supply a down draught. For the purposes of ventilation the apparatus is placed in the roof or ceiling.

[Printed, 4*d*. No Drawings.]

A.D. 1858, April 22.—N° 891.

HARRINGTON, Timothy.—(*Provisional protection only.*)— " My invention consists in ventilating all parts of ships by means " of one or more main pipes leading into a funnel or chimney, or " into a shaft fixed for the purpose in any convenient part of the " deck. In the case of steam vessels I lead the main pipes into " the funnel or into a casing round the funnel, and in sailing " ships I erect a ventilating shaft and lead the pipes into it. By " means of branch pipes I cause the main pipes to communicate " with the cabins, and with all other parts of the vessel requiring " ventilation. In some cases I increase the draft in the shafts or " funnels by means of a steam jet."

[Printed, 4*d*. No Drawings.]

A.D. 1858, May 6.—N° 1011.

BRIDGMAN, John.—(*Provisional protection only.*)—Improvements in cooling air for ventilation. The air is cooled by passing it through tubes or passages in contact with a freezing mixture; or a cold liquid is passed through pipes in one direction while the air is passed in contact with them in the other; the air may be first cooled partially by passing it in contact with cold water.

[Printed, 4*d*. No Drawings.]

A.D. 1858, May 18.—N° 1105.

HIGGINS, John.—(*Provisional protection only.*)—Improvements in purifying air in mines.

"I construct a boiler and furnace to generate steam, and place "it either at the top or bottom of the shaft, or in any convenient "position in the workings of the mine; to this boiler and furnace "I attach piping, the bore of which must vary according to the "extent of the workings, I convey the piping through the mine, "and secure it as near the roof as may be found convenient and "practicable; at certain distances I fix taps, plugs, valves, or "other suitable apparatus in the said pipes, for the purpose of "letting off steam whenever there is foul air or gas accumulating, "so that the steam will mix with the gas and destroy its dangerous "effects or liability to explosion."

[Printed, 4*d*. No Drawings.]

A.D. 1858, May 29.—N° 1215.

MENNONS, Marc Antoine François.—(*A communication.*)—Improvements in fumigating and purifying air. The fumigator consists of a vessel fixed between pivots at top and bottom, so as to revolve readily, and provided at the top with curved arms like a turbine; heat being applied at the bottom, the volatile substances with which the fumigator is filled, pass off in the state of vapour, and produce a rotation which is supposed to facilitate their distribution through the atmosphere.

[Printed, 6*d*. Drawing.]

A.D. 1858, June 19.—N° 1387. (* *)

WINANS, Ross, and WINANS, Thomas.—"A new and im"proved steam vessel." It "consists in the combination of a "hull which may be represented by the two ends of a spindle "divided transversely near the middle of its length with a trans"verse vertical propeller occupying a space between the two por"tions of the spindle, which are secured together by a suitable "framing or sleeve firmly attached to their adjacent ends, and "extending over the propeller, thus combining the two ends and "the connecting frame into a structure possessing the requisite "rigidity and strength. Our invention also comprises the frame "which we call a 'sleeve,' and the series of plates which we call "'*ribs,' for* connecting the ends of this frame respectively with

" the adjacent ends of the two compartments of the vessel " steadying the vessel in the manner of a keel, and together with " the sleeve directing the water to and from the blades of the " propeller. And it further consists in connecting the two end " portions of the spindle-shaped hull by means of towers and a " bridge between them, which will afford ingress to and egress " from each end of the hull, and also afford facilities for the " ventilation of the two parts of the hull."

Other details of construction, contrivances, and the propeller are described.

[Printed, 8*d*. Drawing.]

A.D. 1858, June 21.—N° 1392.

ANDERSON, Sir James Caleb, Baronet.—"Obtaining a " powerful blast for locomotive carriages, blast furnaces, for " ventilating mines, manufactories," and "all descriptions of " houses and ships."

"To create a powerful blast for locomotive carriages, ventila- " tion, and other purposes, I fix horizontally a pipe, of at least " twelve inches diameter extending from the front of the steam " carriage to the front of the ash-pit under the fire-place of the " boiler, or to fixed boilers. The pipe is to be open at both ends, " into the front opening of the horizontal pipe a small pipe of " about an inch in diameter is to be inserted for a short distance; " air being forced by a fan through the small pipe, it will retain " its velocity for a considerable distance within the large pipe " without expanding, and will draw along with it a great volume " of air, by which an intense blast can be obtained by a compara- " tively small power."

[Printed, 6*d*. No Drawings.]

A.D. 1858, June 21.—N° 1403.

SCRIVEN, Gardner Russel.—(*Provisional protection only.*)— An improved "apparatus for ventilating."

"It consists in the combination of a cylindrical drum of uni- " form diameter, revolving on journals which may, by preference, " be horizontal, one of which is tubular from the end of the " drum, with a spiral pipe or passage wound or coiled around or " within the said drum, open at one end so as to freely admit air " and water, or other fluids, in contact with one outer surface of

" the drum, with a free and unobstructed passage through such " coil into the said tubular journal, into which the other end of " one pipe or coiled passage enters water and air-tight through " the said tubular journal into a vertical or other stationary pipe " attached water and air-tight to it by the usual method of packing, and in which it turns out of one side pipe at its opposite " end.

" A reservoir enclosing the cylindrical drum, and in which it " revolves, partially immersed in water or other fluid, provided " with air and water feed pipes, and a float valve to regulate the " quantity of water therein.

" A reservoir, water and air-tight, into which the coiled pipe " communicates through the tubular journal and the air and " water discharge pipe. When necessary, the discharge water " pipe conducting back the reservoir, and an air discharge pipe " for the escape of air.

" And, lastly, a contrivance to receive the water or other fluids " at its maximum point of elevation in the vertical pipe, and " transfer it back to the cylindrical drum."

[Printed, 4*d*. No Drawings.]

A.D. 1858, June 23.—N° 1415.

SPENCER, Thomas.—Improvements in purifying air for the ventilation of buildings. For this purpose a " magnetic carbide " of iron " is employed, and the Specification describes the manner in which it is prepared.

" The air to be purified is made to pass over or percolate through " moistened surfaces of the ferruginous compound. For this " purpose of purification, I prefer to have the magnetic carbide " reduced to a state of granulation equal to coarse gunpowder, " and then placed in flat boxes or trays, not exceeding two or " three inches in depth. When in operation, they ought to be " inclined at a slight angle. An intermittent dip of water let in " at the upper edge of the box or tray is also necessary to insure " the constant moisture of the carbide."

[Printed, 6*d*. No Drawings.]

A.D. 1858, June 24.—N° 1427.

ROBINSON, Joseph.—(*Provisional protection only.*)—*Improvement in ventilating* ships and their water-closets.

"The pipe from each closet is connected to a main sewer pipe, " connected to a powerful exhausting pump, worked either by " hand, steam power, or other suitable means, so as always to " maintain a partial exhaustion of the sewer pipe or pipes, and " thereby cleanse the closets, ventilate the ship, and insure its " safety from the fact of their being but one outlet for any " number of water-closets."

[Printed, 4*d*. No Drawings.]

A.D. 1858, July 3.—N° 1504.

JENNINGS, Josiah George, and LOVEGROVE, James.—Improvements in apparatus used in ventilating house drains or sewers.

"In order to ventilate house drains and sewers we combine an " air valve with the ordinary syphon trap and outlet valve, the " valve being metal-faced; the agent or motive power of venti- " lation being the variation in the temperature of the atmosphere, " and the water discharged into and flowing through the drains " or sewers."

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1858, July 8.—N° 1530.

STANFORD, John Fordham.—(*Provisional protection only.*)— " A new and improved method of and apparatus for applying " heated air in drying corn, hay, and other like articles, in the " stack or otherwise, and in drying goods, and in heating and " drying rooms and buildings." A stove is employed, consisting of a cylinder placed vertically, with an open-framed rim inside, at its lower portion, to support an inner cylinder and a grate. A second smaller cylinder within the first rests upon the rim fixed for the grate, leaving a space between the inner cylinder and the outer cylinder as an air chamber. The grate is placed inside the inner cylinder upon a rim for that purpose, and the inner cylinder is perforated to allow the air which passes through the fire in the grate to pass into the space between the cylinders. To supply fuel the inner cylinder is provided at the top with a feeding pipe which passes through the outer cover of the larger cylinder. The feeding pipe is then secured with a close-fitting moveable cover to fit into the aperture. This apparatus is also made with *one cylinder only*; in such case the grate is of the size to fit the cylinder. Doors are to be made into the cylinders for lighting the fires, &c. A pipe is to be attached to the outer cylinder, by which the hot air is drawn off, and then, by means of a fan blower, forced among the corn or hay, or into any chamber to be dried or heated. The blower is to be fitted inside the pipe by having the portion occupied by it enlarged. The pipe to be continued on and other portions perforated, and terminating with a moveable tapered end for distributing the heated air.

[Printed, 4*d*. No Drawings.]

A.D. 1858, July 10.—N° 1557.

BURRELL, Percy.—(*Provisional protection only.*)

"This invention has for its object improvements in ventilating " sewers and other receptacles of sewage. For these purposes " pipes are laid along the lines of sewers or other receptacles of " sewage, by preference just above them, and at intervals con- " nections of small diameter are made between the interior of " the sewers and the pipes. The pipes are arranged in connection " with suitable apparatus for withdrawing the air and gases from " the pipes into the apparatus which, by preference, consists of " vessels similarly constructed to gasometers, which are moved " up and down by suitable power."

[Printed, 4*d*. No Drawings.]

A.D. 1858, July 14.—N° 1583.

CHAPUSOT, François, and AVRIL, Victor.—(*Provisional protection only.*)—Improvements in exhausting air for ventilating purposes.

"This invention consists in an improved mode of producing a " more or less perfect vacuum, and applying the same to various " useful purposes; the invention is based on the industrial appli- " cation of what is called in natural philosophy the vacuum of " Torricelli."

"The barometric vessel we prefer is made from sheet iron with " cast-iron top and bottom; the stop-cock is constructed in such " manner as to allow of a very gradual opening of the pipe, and " we use an articulated hose for putting the vessel in communi- " cation with the matter to be acted upon by the vacuum."

[Printed, 4*d*. No Drawings.]

A.D. 1858, September 2.—N° 1995.

PITMAN, John Talbot.—(*A communication from William Atwood Royce.*)—Improvements in ventilation, consisting in compressing air by means of an air-pump, and distributing the same "through tubes or conduits or attached or detached reservoirs" to the building or other place requiring ventilation.

[Printed, 10*d*. Drawing.]

A.D. 1858, September 22.—N° 2132.

HARRISON, Charles Weightman.—(*Provisional protection only.*)—Improvements in purifying air for ventilating purposes, consisting in passing the air over carbon.

"The construction upon this principle of air filter or ventilator, "which I have found it most convenient to form and to be "effectual in use, consists in placing a number of moulded "carbon plates in a frame at a small distance apart one from "another. The air being allowed to pass only through the "narrow spaces between the plates, its impurities become "destroyed by the oxidising action of their surfaces."

[Printed, 4*d*. No Drawings.]

A.D. 1858, October 8.—N° 2237. (* *)

WALLER, Thomas.—(*Provisional protection only.*)—"Improvements in stoves and fire-places, for the prevention of smoke "and the better ventilation of apartments." "My invention "consists of admitting streams of atmospheric air through "slots or apertures formed in the sides or backs of stoves "or fire grates just above the incandescent fuel, and of constructing the sides of the grates or stoves so that the rising "smoke shall be caused to impinge thereon and be intermixed with atmospheric air, whereby most of the products of "combustion will be converted into flame, and the production "of opaque smoke prevented." An air chamber or air chambers are constructed at the side or sides to provide a supply of warm air. "The effect of these improvements" are stated to be "the "giving out of a much greater degree of heat" and "the better "ventilation of apartments, for the draught produced quickly "carries off vitiated air."

[*Printed, 4d. No Drawings.*]

A.D. 1858, October 11.—Nº 2268.

NEWTON, William Edward.—(*A communication.*)—Improvements in supplying air to diving apparatus, consisting in "combining with the working chamber or chambers, in which "the explorers are to be placed, a reservoir containing air compressed to such an extent, and in such quantity, and so combined with the said working chamber or chambers, that the "explorers inside may draw the required supply from the said "reservoir to suit their own demands for respiration, and to control the buoyant or rising power of the apparatus."

"The invention also consists in purifying the air inside the "working chamber or chambers wherever it has become vitiated "by the respiration of the explorers inside by a shower of water "either in its natural state or holding in suspension some "chemical agent that has a strong affinity for carbonic acid."

[Printed, 8*d*. Drawing.]

A.D. 1858, October 20.—Nº 2345.

WAINWRIGHT, John.—"My invention consists in ventilating "houses, cabins of ships, and other places by forming a number "of holes in the sash frames (by preference the lower and upper) "and placing over these holes zinc or other metallic plates as "screens to prevent direct draughts into the apartment; or, "instead of perforating the sash frames I sometimes employ "neat perforated boxes or cases inserted in the window or the "door or other suitable place, as may be required, and cover "these with or combine with these metallic screens or plates, as "before described."

[Printed, 6*d*. Drawing.]

A.D. 1858, November 20.—Nº 2640.

JORDAN, Henry.—Improvements in ventilating ships.

"My improvements for the ventilation consist in introducing a "series of perforated pipes or tubes of wood or metal running "round the vessel below the deck beams, and in various "directions over the ship and berths in troop or emigrant "vessels; these pipes are carried to and open out into the "interior of hollow masts, which masts below the cap are provided with openings fitted with closing slides that may be "worked from the deck of the vessel."

[Printed, 10*d*. Drawing.]

A.D. 1858, November 24.—Nº 2669.

NIBBS, James Syson.—"An improved ventilating top applicable to ship, railway, and other lamps or lanterns, and gas "stoves."

"This ventilating top is composed of a metallic cylinder near "the top of which is fixed, on the inside and in a horizontal "position, a plate of metal wholly or in part perforated, and so "constructed as to allow the ascending air to pass freely, and at "the same time prevent a downward current towards the light. "Exterior to this metal cylinder, and near the top, is permanently "or temporarily fixed a metallic plate or screen, wholly or in "part perforated, and wholly or in part inclined from the "perpendicular and surmounted by a metallic plate or dome, in "which no perforations are made."

[Printed, 1*s*. Drawing.]

A.D. 1858, December 3.—Nº 2768.

VASSEROT, Charles Frédéric. — (*A communication from Mathias Welter and George Bohringer.*) — (*Provisional protection only.*)—"An improved apparatus for ventilating mines or other "similar purposes." A cylinder is employed formed of "sheet "zinc having an air passage attached to its side, with valves "opening out from or in the cylinder, according as it is to be "used for ejecting or injecting air. To the one extremity of this "chamber" the "tubes are attached which convey the air from "or to the cylinder. In each end of each cover of the cylinder is "fixed a valve, opening inwards or outwards, as the case may be, "and which serves as the means either to expel or take in the air. "The cylinder has a piston and rod which works within it, the "piston having its face covered with a stuffing of india-rubber, "which is arranged so as to form two lips or rubbing parts, and "the space in the middle being bent or compressed hollow, so "that there is always a pressure upon the outer edges."

[Printed, 4*d*. No Drawings.]

A.D. 1858, December 18.—Nº 2900.

MAC KENZIE, James.—"Improvements in those gas burners "known as ventilating sun burners." In order to prevent a shadow being thrown by such burners, the sides of the internal cones and those of the ventilating funnel are fitted with transparent plates of talc or mica.

The form of burner described consists of a number of jets placed horizontally under two or more sheet iron chimneys. The innermost chimney is furnished with a throttle valve, by which part of the products of combustion of the gas can be thrown back and made to pass through a grating placed between the inner and outer chimneys, in order to cause the jets to burn in a horizontal position.

[Printed, 6*d*. Drawing.]

A.D. 1858, December 21.—N° 2915.

BOLTON, Joseph Holroyd, and GARFORTH, Charles.—(*Provisional protection only*.)—" Certain improvements in drying " yarns or fabrics, and in the apparatus connected therewith." By them the ordinary machines, consisting of heated cylinders, employed for such drying purposes, are dispensed with. The sizing vat is furnished with a series of rollers so arranged that the fabric may pass over a sufficient number of them until saturated with the size. It then passes out of the vat between a pair of squeezing rollers, and becomes partially dried. It is then again passed twice (or so) through the size, and finally between pressing and delivery rollers into a chamber, containing a number of vertical arched plates, arranged in pairs, and forming chambers, and having a series of rollers so arranged that the fabric may first pass under or between, or in the interior of these arched plates to be partially dried. It passes thence along the outside of the plates and over rollers at the top of the outer vertical chamber in which all are enclosed and where the drying is completed. The yarn is then taken out of this chamber in a dry state ; the chamber plates are heated by superheated steam, supplied to the box " at the " bottom of the drying chambers communicating with the said " plates and chamber, and kept in motion " " by means of fans " at certain points in the upper part of the vertical chamber, " being caused to revolve between the layers " of the goods to be dried.

[Printed, 4*d*. No Drawings.]

A.D. 1858, December 29.—N° 2973.

WELTON, Thomas.—(*Provisional protection only*.)—" Improve- " ments in giving or obtaining publicity, and of advertising either " *by day or by night*." They relate to " a method of illumi-

" nating facias, fanlights, show or advertising boards or tablets, " names of streets or stations;" and the apparatus is used as a means of ventilating shops or other places.

Artificial light is allowed to pass either through openings cut in an opaque or semi-opaque ground, and forming the desired letters, designs, or devices; or opaque letters upon a transparent or semi-transparent ground are used. This is carried into effect by making a box, through which is passed an ordinary gun barrel or other gas pipe, in which are inserted a number of burners. Upon one side of this box the required lettering or device is placed; and, when necessary, reflectors may be placed in any required position to reflect the light through the portion of the box upon which the lettering or device is placed. The light may also be reflected in such manner as to light up the goods exhibited in the windows of shops or other places. The cover of the box is made to open for cleansing or repairing.

[Printed, *4d.* No Drawings.]

A.D. 1858, December 29.—N° 2975.

TAYLOR, WILLIAM, and GRIMSHAW, WILLIAM DAKIN.—" A self-acting ventilator or damper regulator for regulating the " admission of natural atmospheric air, and eduction of rarefied " air or gasses from hothouses or any other place." This regulator consists of a cylinder and piston acted on by the hot air or gas and balanced by a spring. The end of the piston actuates an index which is connected with an ordinary circular or other ventilator.

[Printed, *8d.* Drawings.]

1859.

A.D. 1859, January 4.—N° 35.

BEDBOROUGH, ALFRED.—" An improved chimney cowl and " ventilator."

" My cowl consists of an inner tube or conical-shaped flue, " surrounded by an outer case in the sides of which are transverse " openings, with deflecting plates to give an upward direction to " the air entering through them; about two to four inches, more

" or less, from the top of the central tube there is a stop plate " which entirely covers all direct access to the tube from the top " of the cowl, but the smoke and vitiated air ascending through " the tube are carried off through apertures made and fitted in " the form of an ornamental top which communicate with spaces " outside of the covering plate before alluded to. Rain or other " water is carried off from the covering plate through side " apertures, and through tubes which direct the water through " the transverse openings in the case outside of the inner tube, " and tend to keep them clean."

[Printed, 6*d*. Drawing.]

A.D. 1859, January 10.—N° 77.

WHITE, John.—Improvements in purifying air.

" The air to be operated upon is caused to pass through a " channel or channels, into which, and in contact with such air, " water is caused to flow in streams or jets, or the air to be treated " is forced into water in suitable vessels."

" By impregnating the water thus used with suitable purifying " agents adapted to absorb or neutralize impurities combined " with the air, purification thereof will be effected, whilst by " heating or cooling the fluid thus used the temperature of the " air may be increased or reduced to the extent desired."

" Apparatus which I have found well to answer the purpose " of giving motion to the air to be operated upon consists of a " vessel, the two opposite sides of which are connected together " by means of prepared leather or other suitable flexible material " to admit of one or both of these opposite sides being moved to " and fro in the manner of bellows, and by suitable flexible or " moveable channels, the air is caused to pass to and from such " chambers or bellows, and be directed as required."

[Printed, 10*d*. Drawing.]

A.D. 1859, January 22.—N° 208.

BARTER, Richard. — " Improvements in heating and venti- " lating buildings," more especially air baths.

" I propose to admit the air to the heating furnace by a number " of small apertures made underneath the fire-bars on each side " of the ash-pit, the air being brought by flues or passages from " near the ceilings of the hot rooms, and its place therein supplied " *by fresh air* admitted near the floors."

"The floors of the rooms to be heated or covered to the depth "of a few inches with charcoal, over which are laid slates forming "the base of a number of air chambers which are constructed "immediately beneath the bottom of the flue leading from the "furnace."

"The walls and ceilings of the apartments are so constructed "as to be non-conductors of heat by interposing layers of peat "or other non-conducting material, or by forming air spaces or "chambers therein."

[Printed, 8*d*. Drawing.]

A.D. 1859, January 29.—N° 266.

MACKENZIE, JAMES. — "An improved method of operating "ventilating valves, especially applicable to ventilating gas "burners."

"In all ventilating gas burners there is an exit for the products "of combustion and vitiated air; when the burners are not "alight a downward current is liable to enter the apartment in "which the burner is placed and produce cold currents.

"Now, my invention consists in the closing of the exit passage "by means of a valve opened by the pressure of the gas flowing "to the burner, and closed upon the pressure being withdrawn or "cut off."

[Printed, 6*d*. Drawing.]

A.D. 1859, January 31.—N° 278.

BOOTH, JOHN PETER. — "Improvements in ventilating "ships."

"This object is effected by means of vertical or downcast "shafts communicating with horizontal, longitudinal, or transverse shutes or channels provided with apertures arranged in "any convenient manner for the distribution of the air to every "cabin, division, or compartment of the ship or vessel. The "fresh air may, by means of these channels, be conveyed in any "direction where it may be required, and the horizontal, longitudinal, and transverse channels may be made either under "the cabin floors or under the ceilings, as may be most "convenient."

Perforated plates or wire gauze are fixed over the orifices of the pipes. The air may be warmed by the application of heat to the outside of the supply pipes.

[Printed, 1*s*. Drawings.]

A.D. 1859, February 2.—Nº 298.

LANCASTER, Robert.—(*Provisional protection only.*)—Improvement in ventilating coal and other mines.

"My invention consists in supplying heated air to any portion "of the upcast shaft, by which means the air is rarified therein, "and the atmospheric air descending the downcast shaft to fill "up the partial vacuum thus formed, produces as before the "requisite current of fresh air for ventilating the mine.

"In performing my invention the air is highly heated by a "suitable furnace placed at the mouth of the pit, and forced the "requisite distance down the upcast shaft by a blast engine or "other means. I prefer to surround the pipe by which the "heated air is supplied to the upcast shaft with a steam casing "to retain the heat. The heated air is admitted into the upcast "shaft through holes in a circular pipe, or in any other convenient "manner."

[Printed, 4*d*. No Drawings.]

A.D. 1859, February 4.—Nº 325.

MASSON, Jacques Marie Edouard.—"Improvements in "apparatus to facilitate working under water." A submarine boat is described as being filled with compressed air forming the entire supply; without any renewal or any special means for getting rid of the exhalations of the divers, during its stay under water. In order to alter the weight of the boat so that it can be made to sink or rise, the bottom is fitted with a couple of cylinders communicating with the sea by means of pipes regulated by taps, so as to admit water. This water is to be driven out, when the boat has to be lightened, by means of the disengagement of carbonic acid gas from crystals of bicarbonate of soda on which a regulated supply of sulphuric acid is allowed to drop. The same gas can be led into india-rubber bags on each side of the vessel, so that by inflating them, the atmospheric air can, if required, be compressed. "In order to purify the air contained "in the cylinders" forming the submarine boat, "and to absorb "any carbonic acid gas that may escape from the apparatus" for producing it, "it will be well to have a large surface within the 'boat' kept constantly moist with a solution of soda or potash." The boat is provided with a propeller, to be driven by a crank *from the inside;* a rudder, to be worked in the same way; and a weight, to be lowered from the inside, so that it touches the bottom of the sea before the boat can do so, in order to enable it to float before grounding; and with other minor details, such as electric wires to enable the crew to communicate with the people above the water.

[Printed, 8*d*. Drawing.]

A.D. 1859, February 7.—Nº 347.

WILSON, John.—"Improvements in ventilating mines."

A main air pipe is placed in the downcast shaft, and at the bottom of it is placed an air receiver; from this receiver the air is conveyed to the different parts of the mine by means of main and branch pipes fitted with appropriate valves so that it can be discharged in whatever situation and in what quantity may be required. Small branch pipes with mouthpieces are supplied for the respiration of the miners in case of choke damp or explosion.

[Printed, 8*d*. Drawing.]

A.D. 1859, February 9.—Nº 361.

WILKINS, Edward.—Improvements in flower vases for the purpose of admitting air to the roots of the plant. At the sides of the vase are fixed pipes open at the top and with perforated sides; some of these pipes extend partly down the sides of the vase and others extend down to a chamber which forms the bottom, and which is perforated in its upper part. The air enters through the perforations, and liquid manure can be introduced through them.

[Printed, 8*d*. Drawing.]

A.D. 1859, March 15.—Nº 651.

GALLOWAY, George Bell.—Improvements in ventilating vessels, consisting in "forcing air through pipes having perforated " holes, which pipes may be affixed to the beams, &c., so as that " a current of pure air may be supplied, and the foul or vitiated " air may be allowed to escape or be driven off.

[Printed, 8*d*. Drawing.]

A.D. 1859, March 28.—Nº 772. (* *)

RICHARDSON, Charles James.

1. An apparatus for promoting ventilation. The upper part of all the smoke flues in a house are made of iron, square, and in

close contact; the heat from the smoke in any of them will heat the air in those where there is no smoke, and will produce a current of air.

2. A wind guard for the prevention of down draught; a curved cap falls over the top of the flue, and directs the smoke partly below it and partly through an aperture in the top. The cap is provided with perforated metal tops or strainers; its lower edge is spread out at the base to form an annular basin or trough, into which the rain water falls and serves to wash the smoke. Or a "wind cap" may be formed without strainers or troughs.

[Printed, 1*s.* 10*d.* Drawings.]

A.D. 1859, April 9.—N° 897.

BROWN, Robert.—(*Provisional protection only.*)—Improvements in ventilation.

"Ventilation is effected by withdrawing the air rendered impure or unpleasant by respiration, tobacco smoke, or other contamination, from the upper stratum of the air of the apartment down tubes or channels passing through the stove or down the wall, the mouths of such tubes or channels opening near to the ceiling, their lower ends being carried down into, or around, or in contact with the exterior of the channel through which the fresh cool air enters, and which fresh air, by reason of such contact, imbibes a portion of the warmth of the descending column of impure air, the rapidity of the current of such descending impure air being increased by the condensation thus produced in it; the lower end of the tube or channel is then turned up a passage in the stove leading to the flue, which it either surrounds or enters, and then passes into the chimney,"

[Printed, 4*d.* No Drawings.]

A.D. 1859, April 12.—N° 914.

NOUALHIER, Eugène Théodore.—(*Provisional protection only.*)—"An improved ventilator."

"The apparatus consists of a suitably constructed cylinder, to the upper prrt of which a tube for the entrance of air is soldered so as to communicate with the interior thereof. To one end of the cylinder a pipe is adjusted, which passes through and extends a short distance beyond its opposite end, to which opposite end of the cylinder is soldered another tube of larger

" diameter than the first (with which it forms one whole), so as " to leave a small space between it and the first tube for the " egress of air from the cylinder. Thus the air entering the top " pipe passes into the cylinder, and afterwards into the large and " smaller tubes, forming thereby a double current of air."

[Printed, 4*d*. No Drawings.]

A.D. 1859, April 30.—N° 1087.

CLARK, WILLIAM.—(*A communication from Francois Aquilas Laurent.*)—Improvements in the ventilation of diving apparatus. Two tubes are attached to the diving bell or receiver, through one of which the air is exhausted by an air pump, and through the other, which is open to the atmosphere, fresh air enters.

[Printed, 4*d*. No Drawings.]

A.D. 1859, May 6.—N° 1142.

JONES, THOMAS.—1. An apparatus for warming air consisting " of two principal parts (made of fire-clay or other incombustible " and heat retaining material) which form when bolted or placed " together a chamber or cavity in which air can be heated;" it is placed at the back or otherwise in close contact with the fire-place. 2. Ventilating apartments by conducting fresh air down a chimney or shaft into the various apartments to be ventilated, where it is distributed and allowed to escape by an ordinary ventilator into the chimney: it may be heated in the above-mentioned apparatus if desired.

[Printed, 10*d*. Drawing.]

A.D. 1859, May 7.—N° 1156.

JEFFERY, WALTER.—Improvements in ventilators for photographic tents. The ventilators consist of a pipe bent at right angles so as to admit air but not light; they are attached to single ring plates, and are placed where convenient.

[Printed, 1*s*. Drawings.]

A.D. 1859, June 2.—N° 1358.

PARKES, WILLIAM HENRY, and BAGNALL, WILLIAM.—Improvements in ventilators for hats and carriages. For ventilating hats a circular aperture is made in the centre of the crown, and a circular piece of the same material as the hat is attached to the end of a screw which works in a metal bridge fixed below the aperture, so that it can be brought nearer or farther from the hole, and the amount of air admitted can be regulated. For ventilating carriages a circular orifice is made in the roof fitted with a perforated plate, and surrounded by a standing up ledge, over which fits a metal cap, which can be raised or lowered by means of a screw passing down through a metal bridge placed below the aperture and worked by a thumbscrew from beneath.

[Printed, 8*d*. Drawing.]

A.D. 1859, July 2.—Nº 1578.

COOK, Charles Hill Penny.—(*Provisional protection only.*)—"Improvements in ventilators and ventilating flue or chimney "tops." In a house an aperture is made near the ceiling of each room communicating with the flue in the wall. This aperture is fitted internally with a series of inclined pieces, so adjusted as to afford access for the air in the apartment to the chimney. In the centre of the aperture are placed hollow conical or pyramidal "chambers with their apices directed towards the apartment and "their bases towards the chimney. The sides of the aperture are "fitted with corresponding half cones or pyramids, their open "bases being turned in a direction the reverse of the central "chambers and alternated with them in such manner that the "apices of the central chambers are at or about at a level with "the bases of the external chambers, in lines drawn trans-"versely across or through the aperture."

Or the interior of the aperture may be fitted on its sides with reversed diaphragm pieces forming open chambers in combination with the sides of the passage. This plan is also applied to the chimney top, which is left entirely open, except in as far as the diaphgram portions fill up the flue.

Or the chimney top is formed in two tubes one within the other, the central tube being fitted with alternated open-topped chambers with diaphragm sides up, along, and between which the air and smoke current can pass to the top. As applied for ordinary ventilating, the open bottom of the main central tube coincides with the level of the roof; whilst the air inlet is all round this portion, the fresh air being deflected laterally into the room. A similar effect may be produced by placing them in other and different positions, the inclined chambers being always so reversed as to secure currents of fresh air inwards and vitiated air, smoke, or gases outwards. The top of the roof ventilator may have an ornamental cover open all round. The centre chambers can be adjustable in concert with their corresponding diaphragm pieces by a rack and pinion movement worked by a cord pulley descending below.

[Printed, 4*d*. No Drawings.]

A.D. 1859, July 11.—N° 1648.

DIBLE, James, and GRAVELEY, William Henry.—Improvements in ventilating ships.

"This invention refers chiefly to improvements upon an " invention of James Dible, patented the 2nd November, 1852, " No. 612, but is applicable to other ventilating apparatus where " shaft rising above deck is used. The present invention con- " sists in surrounding the shaft from the deck to, say, from one " to five feet, more or less, with a case with a glazed top capable " of being raised upwards from the upper edge of the case, for " the purpose of allowing the escape of foul and vitiated air, " while the glass in the top allows of light entering between " decks. We fit a valve in the interior of the shaft, and provide " an india-rubber or other like suitable seat in order to prevent " the ingress of the sea in heavy weather."

[Printed, 6*d*. Drawing.]

A.D. 1859, July 27.—N° 1742.

DAVIES, John.—An improved ventilating apparatus, consisting of,—

"Two tubes or passages, situated one above the other, placed " at the upper part of the wall of the room to be ventilated, and " communicating between the said room and the external air, " the heated and vitiated air escaping from the room through " the upper tube, and the fresh air entering the room through " the lower tube, the said tubes being constructed and provided " with valves."

[Printed, 8*d*. Drawing.]

A.D. 1859, July 28.—N° 1750.

KENT, William. — Improvements in fans for cooling apartments.

"My invention consists in constructing a fan or punkah, or
" similar apparatus, which is moved by clockwork or wheelwork,
" actuated by a spring or weight, which is wound up from time
" to time. The fan is attached or connected to a lever or pendu-
" lum, or spindle or crank, or other part of the clockwork or
" apparatus by which it is put in motion. The fan may be plain
" or spiral, or of other suitable form."

[Printed, 6*d*. Drawing.]

A.D. 1859, September 2.—Nº 2005.

GOFF, Strangman Davis, DAVIS, Henry, STRANGMAN, Samuel, and STRANGMAN, Edward.—"An improved method of and apparatus for drying malt, corn, and other articles," such as meat. A drying room or a sheet iron kiln heated by hot air injected from a fan is divided into an upper and lower chamber by a wire or perforated metal floor. On this floor the malt is placed and partially dried, and it then passes out by a shoot communicating with one end of the screen in the lower chamber. This revolving screen wire cylinder is open through the centre and has no central shaft passing through it. The interior is provided with curved blades extending its whole length and fastened to its internal circumference and to the two ends extending inwards about half way to the centre. The screen is on bearings and has an opening at its lower end for the exit of the malt. It is revolved by means of gearing, and the journals on which it turns are fixed to the covers at the ends of the screen. The conduit for the admission of the heated air from the fan is placed towards the bottom of the chamber near the exit for the grain.

[Printed, 6*d*. Drawing.]

A.D. 1859, September 26.—Nº 2175.

SIEVIER, Robert William.—(*Provisional protection only.*)—
" Improvements in the means of creating a draught so as to
" remove the gases which may be produced by combustion or
" from places where gases may be generated, where they may
" be detrimental to health." The flue or funnel has a nozzle or nozzles, or jet or jets of air, steam, or gases, so arranged inside that they may impinge upon certain parts of this chimney, flue, or funnel. A draught may also be created by mechanical means to produce the same effect as that by the jets.

[Printed, 4d. No Drawings.]

A.D. 1859, November 3.—N° 2505.

WEMYSS, George.—"Improvements in ventilators."

The ventilator, which consists of a metal pipe, is fixed in the thickness of the wall at the upper part of the apartment to be ventilated, and extends from the outer air to the inner surface of the wall; the inner end is covered by a perforated plate through which the air from the apartment enters and strikes against a baffle plate behind; passing round the edges of this plate it enters through a number of lateral slots into a box behind the plate, and from this passes straight through the central tube to a similar box at the outer end, from which it issues in a similar manner to the outer air.

[Printed, 8*d*. Drawing.]

A.D. 1859, December 12.—N° 2816.

STATHER, Thomas.—(*Provisional protection only.*)—Improvements in ventilation, consisting in fixing a "box open at both "ends" in the upper part of the wall of the room or other place to be ventilated.

"The mouth towards the external atmosphere or chimney " breast is contracted or partially closed. The inward mouth is " also partially closed, either by a central plate or by a portion of " the box, whilst the remaining uncovered portion of the larger " or inward mouth is closed in by finely perforated plates or wire " gauze."

[Printed, 4*d*. No Drawings.]

A.D. 1859, December 30.—N° 2984.

SMITH, William.—(*Provisional protection only.*)—Improvements in chimney linings and ventilation.

"According to this invention each chimney has fitted into its " bottom or lower end, immediately above the part where the top " edge of the grate joins up to the lintel brace or upper portion " of the mantel-piece, a fire-clay lining piece formed with a wide " oblong throat to embrace the space over the fire-grate. The " lower edge of this lining piece or 'oncome,' as it is technically " termed, is formed with a horizontal flange all round."

"For ventilating purposes, each lining piece above the 'oncome' " is formed with a separate narrow ventilating thoroughfare, and

" the bottom section having a lateral opening in it, air can thus " pass into a continuous ventilating thoroughfare from the apart- " ment, and so ventilate it in a most complete manner."

[Printed, 4*d*. No Drawings.]

1860.

A.D. 1860, January 20.—N° 146.

SHAW, John.—Improvements in ventilators for hot-houses and conservatories.

" I construct them within framework and with glass, so as to " afford a general appearance uniform with the usually glazed " parts, and I adapt apparatus for simultaneously opening or " closing a number of them. Also I use glass in like manner " for those ventilators which are at the top and back of the " building when erected as a 'lean-to.' "

"Another part of my improvements consists in a method of " constructing or arranging ventilators for span-roof houses. In " such erections I form an opening on either side of the ridge, " and within adapt apparatus acting after the manner of a " throttle valve, so that by being turned the admission of air is " regulated."

[Printed, 6*d*. Drawing.]

A.D. 1860, January 23.—N° 167.

ANDERSON, Murray.—(*Provisional protection only.*)—" An " improved ventilating apparatus."

" The apparatus consists of a frame in which are fitted two " plates of glass or other material, parallel to but at a small " distance from each other, each plate being of less area than the " aperture of the frame, the outermost plate being so fixed as to " leave an open space above it between the top edge thereof and " the upper part of the frame, and the inner plate being fixed so " as to leave a similar space open between the lower edge thereof " and the bottom of the frame. A constant current of air is thus " allowed to pass between the two plates."

[*Printed*, 4*d*. No Drawings.]

A.D. 1860, February 14.—N° 402.

NEWTON, William Edward.—(*A communication from George Calhoun.*)—An improved chimney cap or cowl for ventilating purposes.

" The apparatus consists of an upright throat, which, when " applied to a chimney, is fitted to rotate upon the open end of " the chimney pot, or upon an upright shaft or pipe. This upright " throat terminates in an elbow, at the back of which there is " placed an open horizontal truncated cone, the truncated or " smaller end of which is next the elbow, and is concentric with " the horizontal portion thereof. A hollow horizontal truncated " cone, much larger than the former one, is placed concentric " with, and surrounds the elbow pipe, and a shorter truncated " cone is connected by its truncated end to the truncated end of " the larger cone. These two larger cones contain the elbow and " the smaller cone within them, and their truncated ends unite " opposite the mouth of the elbow. The top of the larger cone " may, if desired, be furnished with a vane to keep its mouth and " the mouth of the small cone towards the wind."

" An artificial draft may be produced by introducing a jet or " jets of steam at the mouths of the cones."

[Printed, 8*d*. Drawing.]

A.D. 1860, February 17.—N° 437.

MORRELL, Thomas Henry.—Improvements in ventilating brick kilns.

" Around the lower end of the chimney, and communicating " with the central shaft, is arranged a series of flues or ventilators, " the lower end of each of which also communicates with one of " the sheds or stoves, and is provided with a damper for the " regulation of the heat and ventilation as may be required. " These flues or ventilators, by means of the draught caused by " the smoke ascending the central shaft, draw the heated air out " of the hot air chamber through the apertures along each side of " the sheds or stoves, (through and amongst the bricks and other " articles that are drying) to the chimney, and at the same time " carry away quickly with the current of air all the vapour or " moisture arising from the drying articles."

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1860, February 24. N° 503.

SALISBURY, Robert.—(*Provisional protection only.*)—"An "improved method of adapting sheds and other buildings to the "purpose of drying pipes, tiles, bricks, and other articles made "from clay or other plastic materials," "previous to firing the "same in kilns." The drying sheds are made "with hot air flues, "or with pipes heated by exhausted steam, or by steam direct "from a boiler, or by hot water." In order to keep up a circulation of air, a fan is used for throwing a current of air into the sheds, which are connected with the furnace chimney. This chimney is built "with an outer shaft surrounding an inner shaft, "which takes the smoke and heated gases from the" "boiler "furnace. Openings are made in the walls of the drying sheds "for leading off the moist air," by means of flues, to the ventilating shaft, which may communicate or not with the inner shaft.

[Printed, 4*d*. No Drawings.]

A.D. 1860, February 29.—N° 557.

WILLIAMS, William.—Improvements in apparatus for effecting ventilation. The apparatus consist of one or more air pumps fitted with pistons in the ordinary manner and driven by a steam engine.

"I prefer to mount the air or exhausting cylinders upon suit- "able framing, columns, or standards, and work the piston by "means of a rod through the lower cover and place the engine "within the framing and beneath the air or exhausting cylinder "so that the engine may act direct upon the piston. Instead "however, of working the larger piston direct from the piston rod "of the steam engine, the steam cylinder being at the bottom "and within, whilst the air or exhausting cylinder is at the top of "and supported upon the framing, columns, or standards, I prefer "in other cases to place the steam cylinder immediately beneath "the air or exhausting cylinder, and work it as an inverted engine "with a cross head working in suitable guides."

[Printed, 10*d*. Drawings.]

A.D. 1860, March 3.—N° 590.

BAUER, William.—"Improvements in apparatus for diving "*and for raising* and lowering bodies in water, parts of which "*improvements* are also applicable to other useful purposes."

One form of apparatus for diving consists of a metallic chamber, completely enclosed, except at the man-hole, and filled with air at the ordinary pressure merely. "The air space within "the chamber is amply sufficient for several hours' consumption "of three persons," and it can be renewed, "by means of "two air tubes, one of them being in connection with the air "pump on board the ship, and the others serving as an outlet to "the vitiated air." "Or the air may even for a limited time be "to a certain extent purified by the admission of oxygen, which "is kept in store in a compressed state." The bottom of the chamber is double, and the intermediate space is used for receiving water ballast, driven into it by means of a force pump from within. At different parts of the apparatus are bull's-eyes for allowing the operators to look out and steer the chamber, which can be moved forward by a screw propeller, and worked round by means of another screw at right angles to the first, while between the two is a rudder for steering. To prevent it from drifting an anchor can be lowered; and to allow it suddenly to rise, a weight, suspended from the bottom, can be let fall from within. The whole diving chamber communicates with the ship by means of an electric telegraph.

Sunken ships are raised by means of flexible air balloons, inflated and attached to the object to be raised by means of cords fixed to an iron ring, to which is looped a chain, suspended from which is an iron lever for insertion into a port hole. The partially inflated balloons are lowered down with the air supply pipe inserted in them, the iron arms being dropped between iron lugs, projecting from the body of the diving chamber, where they are secured by hooks. The whole apparatus is then lowered down by chains from the ship in attendance, the object being then to attach the balloons to the sunken ship or other thing to be raised. The same diving chamber can also be used for examining sea walls, or plants at the bottom of the sea; and it may, for these purposes, be fitted with instruments to be actuated from within.

Instead of this independent diving chamber, it may be made to form a portion of a submarine ship, such as that described in Specification No. 1281, A.D. 1853. A recess is formed in the ship's side for admitting a diver with helmet and dress. The partition separating this recess from the air chamber within the ship is fitted with a door opening outwards, and the second partition, in contact with the surrounding water, is made with another door, opening outwards and fitted with a disc valve. The chamber thus enclosed communicates with the air chamber of the ship by a valve attached to a floater. The floor is provided with a disc valve for communicating with the hollow keel of the ship. As soon as the diver has entered by the door he closes it, and admits water from without by opening the disc valve in the second door. On the diving chamber becoming filled with water, the air valve orifice will be closed by the floater. The diver opens the second door in order to step out and commence his work. On the diver wishing to re-enter the ship he reverses the order of these operations.

The diver should be provided with means of re-inhaling the air he has been breathing in a renewed state, and of ascertaining in what direction he is going. His helmet is hence provided at the back with two short projecting tubes, to each of which a flexible pipe is attached, connected by a cock with an elastic bag extended by spiral springs. This bag is tied round the diver's waist and contains oxygen and hydrated potash. The vitiated air will pass into this bag through one of these tubes and re-issue into the space between the diver's head and his helmet in a partially purified state. The diving helmet is fitted with a ship's compass upon which the light is admitted by a bull's-eye, so that the diver can see the needle. In the front of the helmet and below the bull's-eyes through which the diver can see surrounding objects is applied a disc valve, which he can open for the admission of air, as soon as he gets back into the diving chamber. The diving dress is caused to adhere about the shoulders by a band of india-rubber, and the helmet can be connected with it by drawing another similar band over the first and inserting the shoulder piece between the two, its lower edge being provided with a border rounded outwards, over which the second strap closes. Ballast is suspended underneath the bag in the shape of metal rings, embracing the diver's body and supported by the iron strap which holds down the helmet.

This Specification embodies a number of other combinations not relating to ventilation. The diving chambers are to be used "as floating and immersable telegraph stations;" the apparatus is also to be used for grasping, raising, and lowering cables in coral fishing, and similar operations. The drawings should be consulted for numerous details of apparatus for raising objects *from the bottom* of the sea.

[*Printed*, 2*s*. Drawings.]

A.D. 1860, March 28.—N° 796.

WEEMS, JOHN.—"A system or mode of arranging and con-
"structing apparatus for heating air, and of causing the current
"of heated air to return and circulate wholly or partly through
"the building and apparatus alternately." The apparatus consists of a series of vertical tubes fitted in a case, through which and around the tubes the hot air from a furnace passes, while the air enters by a passage communicating with the bottom of the tubes, and passes off to the apartment to be heated by a second at their upper ends.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1860, April 11.—N° 903.

ATKINSON, ROBERT. — Improvements in chimney tops and ventilators.

"On the outside of the pipe or tube forming the chimney top
"is fixed a series of vertical ribs with tapering cross-pieces
"attached to the edge thereof, forming a series of T-shaped ribs
"round the said pipe or tube. When the wind strikes the
"chimney top, it enters, and between these T-shaped ribs, and
"its egress being prevented by the overhanging edges of the said
"ribs, it is forced to travel upwards through openings provided
"into the interior of the chimney top, and thus causes an upward
"current. A series of chambers are also provided round the
"exterior of the chimney tube or pipe and communicating with
"the interior, for the purpose of increasing the upward current
"of air; and also short interior tubes or flat rings for directing
"and dividing the currents."

[Printed, 6*d.* Drawing.]

A.D. 1860, May 1.—N° 1096.

TAYLOR, JAMES. — (*Provisional protection only.*) —Improvements in ventilators for chimneys and air flues.

"This invention consists of an apparatus composed of two or
"more tubes or pipes placed over and around each other so as to
"leave a space around and between each.

"The aforesaid tubes, pipes, or conduits may be of any desired
"shape and height, and may be formed of different lengths, that
"is to say, the second tube may be shorter than the first, the

" third shorter than the second, and so on according to the " number employed, the bottom edge of each tube or conduit " being fixed several inches above its inner adjoining tube or " conduit, forming as it were steps; the bottom of each is to be " fitted with an adjustable sliding piece for regulating the quantity " of air passing between the space of each tube."

[Printed, 4*d*. No Drawings.]

A.D. 1860, May 31.—N° 1341.

ALDIN, Charles.—Improvements in ventilating floor or paving tiles for the purpose of keeping them dry.

" My invention consists in constructing tiles with a space " arched out or otherwise formed hollow on the under surface, so " that they may rest upon, by preference, four points, and afford " passage for air under the remaining parts of the tile. I prefer " to form the tiles of white clay."

[Printed, 6*d*. Drawing.]

A.D. 1860, June 12.—N° 1442.

NEWTON, Alfred Vincent. — (*A communication from Asa Hopgood.*)—" An improved carriage ventilator."

"The present invention consists in the employment of a light " wheel composed of a shaft, in which is inserted a large number " of rods or spokes placed close together, the wheel being so " arranged in a suitable casing or box, that it will be revolved by " the current of air passing through the box, and impinging on " the spokes of the wheel, which are exposed to the current whilst " the spokes as the wheel revolves are kept wet by being dipped " into water to purify the air."

[Printed, 8*d*. Drawing.]

A.D. 1860, June 16.—N° 1473.

CLARK, William. — (*A communication from Charles Joseph Emile Pavy.*)—" Improvements in storing & preserving grain, & " in apparatus connected therewith." They consist in constructing granaries in such wise that they can be periodically emptied of their contents, which are to be winnowed, in order to keep the grain in a sound state. The application of ventilation is left rather dubious, and the allusions to actual ventilating, as distinguished from fanning, are confined to the last paragraph quoted *in this abridgment.*

The general type of granary described in this lengthy Specification consists of a tank divided into compartments either placed vertically side by side, like a number of large organ pipes, on a single floor, or on one with a double bottom, where each reservoir empties itself into the winnowing or corn cleaning machine or into sacks. When composed of several cylindrical reservoirs the grain is housed in the spaces left between the cylinders. In order to preserve and clean the corn it is caused to fall into a winnowing machine, which then delivers it on to a chain of buckets, by which it is raised to the highest part of the granary to fall into another reservoir. The corn is to be thus winnowed several times in a year. Besides square and cylindrical reservoirs they are also built of segments of baked clay, which may be either hollow or not. They are united by hoop iron connecting every two courses of superposed segments. Each reservoir has an inclined bottom, and a cover also of baked clay. A large covering embraces the whole of the cylinders. The reservoirs are placed on a horizontal floor, resting on beams forming part of a frame supported by posts; a wall consolidates the frame and forms the base of the granary, consisting of a room with doors and windows. In the centre of the chamber is placed a post supporting a Jacob's ladder for conducting the wheat from the winnowing machine to the summit of the granary. The winnowing machine is placed between the central post and the wall. The granary is also furnished with a weigher, a counter, and a measurer, through which latter the wheat passes before falling into the sacks.

In the case of outdoor granaries the steam engine or other motor is to be placed on one side, and on the other the threshing machine, which delivers the wheat and cleans it. Besides the granaries composed of several cylinders, single cylindrical reservoirs may be used, divided in the interior into vertical compartments by a central column having as many grooves as there are to be compartments, corresponding grooves being made in the sides of the cylinder. The cylinder and compartments are formed of baked clay, and these partitions placed on edge and fitted into the grooves. Each division has at its base a tube, through which the corn runs either to the winnowing machine or to the fan, to be cleaned, or to the weighing machine and meter.

A cheap arrangement of granary consists of reservoirs of baked clay holding from three to thirty bushels and up to one thousand eight hundred bushels. Such a reservoir may be placed either in the open air, in a barn, or in the living rooms of cottages. It is filled by pouring the corn in at the top, and emptied by opening a valve closed by a key, by turning which the corn will fall, already measured, into the sack. The reservoir is placed at a sufficient height above the ground, so that the grain may be emptied into a winnowing machine. The segments of which the clay cylinders are composed are to be made by squeezing them through a mould so that they fit into one another. The spaces left in their thicknesses will obviate any inconvenience arising from contraction. "The multiplicity of the segments is regulated according to the "amount of aeration required for the grain, which aeration may "be prevented in damp weather by means of small holes made "in the tops of the cylinders; a current of air will freely circulate "throughout the thickness of the hollow segments." These segmental earthen cylinders may be applied to other uses, "such "as large drain pipes, sewer pipes, shafts, arches, kiosks, cottages, "vats, and tubs." The segments are jointed with plaster, cement, Roman cement, hydraulic lime, or bitumen.

[Printed, 2*s*. Drawings.]

A.D. 1860, June 22.—Nº 1521.

MACFARLANE, WALTER.—Improvements in roof gutters for ventilating purposes.

"There is attached to the sides of the cast-iron centre or valley "roof gutters, a bracket or attachment for fixing or suspending "the beams or astragals of the skylight in such a manner as that "the water of condensation on the inside of the sash may drop "or flow into the gutter, and at the same time provide a passage "for fresh air being admitted into the apartment."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1860, August 1.—Nº 1861.

JACKSON, JOSHUA.—"Purifying and cooling water and atmo-"spheric air." A form of filter is used consisting of hoops over which are stretched pieces of hair cloth, wire gauze, or perforated metal. Each disc but one is filled with purified wood or charcoal made from sawdust, burnt in an open furnace and boiled in water. One of each series of discs is filled with sponge, and the set are arranged one above another, "leaving a space between each to "*allow a free* circulation of air over their surfaces." They are suspended on cords or fixed on a frame or stand, and above them is a vessel acting as a reservoir, having a valve in its bottom, "below another vessel as a receiver with a float in it connected "by rods and a lever with the valve in the reservoir above." The water from the reservoir drops through into the receiver until it brings up the float which closes the valve and stops the supply. The whole apparatus may be covered with a bell, perforated or whole. The water may also be conveyed to the filter through a pipe.

"To cool and purify air the purifier is first charged with water," "and suspended in the current of hot air (over a burning lamp, "for example), which coming in contact with the watery vapour "arising from the receiver, absorbs it and ascends through the "purifiers." "When the apparatus is suspended in heated air "near the ceiling of a room, the current of air is reversed, enter-"it at the top," and escaping at the bottom.

Other shapes than the circular can be adapted for the discs. To clear the filter it is washed in water; to clean it, "the "purifiers" are boiled in rain water.

[Printed, 6*d*. No Drawings.]

A.D. 1860, August 9.—N° 1935.

NEWTON, Alfred Vincent.—(*A communication from Sidney Mason Stone.*)— "An improvement in ventilating buildings, "vessels, and mines."

"This invention relates to the employment of an air-duct or "passage heated by a flue or a steam pipe passing through it in "such a manner as to rarefy the air within it, and create an up-"ward current therein for the purpose of carrying off the impure "air from a building, ship, or mine, such air-duct to be in com-"bination with another duct or passage for admitting pure air to "the building, ship, or mine, by which combination a constant "circulation and distribution of pure air to the space requiring "ventilation is obtained."

[Printed, 8*d*. Drawing.]

A.D. 1860, August 14.—N° 1963.

BILLING, John.—Improvements in the tops of chimneys and ventilating flues.

"I construct a number of bars of angular, semicircular, para-"bolic, or other gutter-shaped form, and I place several of them

" in proximity and parallel to each other, or radiating to a centre. " If a grating, or fan, or star be thus formed it will be easily " permeated by a current of air in one direction, which will be " guided by the gradually contracting passages between the bars, " while, if a current of air be moving in the opposite direction, it " will enter the gutters, and regurgitate and be reflected back- " wards, and thus oppose a great resistance to the passage of " the air."

[Printed, 10*d*. Drawing.]

A.D. 1860, September 14.—N° 2228.

PAUTARD, PAUL.—(*A communication from Benoit Rouquayrol.*) —" An improved apparatus for supplying air to persons in water, " and in mines or other places." This apparatus consists of a metal receiver into which pure air is forced under a pressure of twenty or thirty atmospheres, and from which it is supplied by a pipe and inhaling apparatus as required. Caustic potash may be used to remove carbonic acid from the vitiated air, and oxygen may be supplied from a receiver.

[Printed, 8*d*. Drawing.]

A.D. 1860, September 26.—N° 2332. (* *)

FERRABEE, JAMES, and **FERRABEE**, HENRY.—(*Provisional protection only.*)—" Our apparatus for lighting, heating, ven- " tilating, and cooking by gas consists of two cases, an inner " and an outer case, made of suitable materials, and constructed " so that when placed one within the other there shall be a space " around, above, and below the inner case, between it and the " outer case. The cases may be of a cylindrical or other suitable " form. The bottom of the outer case has a regulating valve " fitted to it for admitting air, and the top of this case is so fitted " that when it and the valve are closed, the case is almost air- " tight. Within the inner case the jets or burners for the gas are " placed in connection with a supply pipe passing through the " outer case and in through the close bottom of the inner case. " Suitable apertures are made in the inner case for the admission " of air from the outer case, to support the combustion of the " gas." "In constructing the inner and outer cases we intro- " duce glass, or some other transparent material, in such a manner " as to allow light to be transmitted to a room." Lamps may be constructed on the same principle. "Lamps and apparatus thus " constructed may be either suspended or supported, and may be " used for heating as well as lighting."

" Ventilation is accomplished by the atmosphere being con- " stantly absorbed and changed by the apparatus."

[Printed, 4*d*. No Drawings.]

A.D. 1860, September 29.—N° 2360.

ROBERTS, JOHN. — Improvements in ventilating stacks and granaries.

"To effect the drying of stacks of grain and grass or clover " hay, built up while the produce was in a damp state, I place in " the stacks, while being built, perforated ventilating tubes, say, " a vertical in the centre of the stack, and horizontal pierced " tubes radiating therefrom, the ends of all of which project " slightly beyond the stack that is at the sides and top thereof."

"To dry wheat or other grain in granaries or stores, I form " openings in the outer walls on a level with the flooring, and " cover each opening with perforated zinc inside and out, fitting " a sliding door inside to admit or prevent the access of currents " of air to the corn. Opposite these openings I place perforated " tubes of zinc or other suitable material, the tubes being long " enough to extend across the building to corresponding openings " in the opposite outer wall."

[Printed, 4*d*. No Drawings.]

A.D. 1860, October 9.—N° 2452.

REID, GEORGE.—(*Provisional protection only.*)—Improvements in ventilation.

"The feature in my invention which distinguishes it from those " at present in use consists in using two or more shafts placed at " a distance from each other, the one (or more) to serve as an " inlet, the other (or more) as outlet."

"In my arrangements for ships I use tubes or shafts of dif- " ferent lengths alternately from the various decks, open at the " lower ends, and communicating with one or more passages or " flues, terminating in a suitable receiver or rarefier formed " round or near to the funnel or chimney, into which latter or " through one of my guards or fenders I exhaust the foul air. " The same arrangement could be used for maintaining an uni- " form temperature in the cabins by fixing a fan in the passage

" or flue, which, when put in motion, would force the air through " the tubes."

[Printed, 4*d*. No Drawings.]

A.D. 1860, October 18.—Nº 2537.

WHITE, ARCHIBALD.—" An apparatus for drying hay, corn, and " roots, and other things."

A chamber, either fixed or portable, contains lines of rails on which carriages can run from one of its ends to the other. One of the ends of the chamber is open to permit the escape of the air after passing in contact with the hay, &c. and to allow the laden carriages to be put on the rails. Portions of its side, or of each of its sides, are moveable to allow the carriages to be placed on or removed from the rails, and the hay, &c. to be got at to turn it. The other end of the chamber is to be closed and at that end is a set of fans, similar to the fans of a winnowing machine, for each set of rails. They drive the air over and under the rails and carriages and out at the other end of the chamber. A rectangular frame is placed at each of the openings in the sides of the chamber for placing in the hay, &c. to be dried, and the carriages to be taken out and turned. Flat levers, resting on brackets attached to posts supporting the roof, are used for moving the carriages in and out; and, if required, by the aid of pulley tackle with rollers. Or two spars pass over and rest on each frame, and when used are so passed under the carriage to be moved that it may be supported on them, and by means of the rollers underneath may pass out of the chamber on to the frame, or *vice versâ*. Each of such frames is to have a covering, and that over the frame next the fans is to be sufficiently large to also cover a cart. The whole of one side of the chamber for a space as wide as the frames is covered by a roof, and under this roof is a line of rails on which runs a truck. The carriages, as they are emptied, are to be conveyed from the fans to the other end of the chamber to be again filled, and they are to have their bottoms formed of wire work, or bars sufficiently open to allow the air to have access on the under side to the hay, &c. Each is to have on the under side four rollers with guides on which the carriage can rest and run on the spars. Each carriage has a wire lid or a sufficient number of spars to be over the hay, &c. while being dried.

The chamber or the rails are to have a sufficient fall, as on each carriage being filled and placed on the rails, it can be coupled to the carriage next it. The carriage at the end to be held by a chain to prevent it and the carriages coupled to it passing too rapidly towards the fans. This chain is to be passed round and acted on by a roller with ratchet work and friction break, or catches may be used in combination with the levers. As each carriage next the fans is emptied, the whole line of carriages on the rails is to be allowed to approach one carriage width nearer the fans, other full carriages being successively added.

Instead of the chamber a barn may be fitted up with hurdles supported horizontally by scaffolding, with sufficient planks laid horizontally between such hurdles to allow the hay, &c. to be conveyed to and spread on them. In this barn there is fixed a shaft having rotating fans attached to it, the air being driven out through openings.

[Printed, 4*d*. No Drawings.]

A.D. 1860, November 7.—N° 2733.

COOKE, William.—" Improvements in ventilating."

1. For admitting air to apartments a sheet of wire gauze is attached to the upper part of the sash, and also to the soffit, being made so as to roll on a spring roller attached to the soffit, or to fold up when the window is closed, but to unfold and cover the space when the window is open.

2. A curved pipe is also fixed in the ceiling, the outer end being turned down to prevent the entrance of rain.

3. Air is conveyed by a pipe under the hearthstone of an apartment, and being heated escapes from thence into the room.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1860, November 21.—N° 2853.

COOKE, William.—" Improvements in ventilating."

The Specification contains many of those improvements described by the same patentee in his Specification N° 2733 (*antè*), it also contains a description of air shafts to be used for ventilating buildings which are "built up in 4½-inch brickwork in case of " new buildings, otherwise they may be constructed in wood or " any other material, the shafts being carried through from room " into the roofs;" the tops of these shafts are to be covered by curved pipes, as described in the above-mentioned Specification, or by " ordinary dormers."

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1860, November 27.—Nº 2908.

WOOD, William Selby.—Improvements in chimney pots for ventilation and other purposes, consisting in "in placing one " chimney pot within another of greater diameter, from the base " of which a draught is obtained. The interior pot is constructed " with slots or perforations in a vertical or other position, for the " purpose of enabling the outer pot to be cleansed when required. " When necessary a hood or cover is placed on the top to adapt " it to ventilating purposes, in which case the vitiated air passes " gradually away through the slots or perforations in the interior " pot or tube."

[Printed, 6*d*. Drawing.]

A.D. 1860, December 10.—Nº 3028.

HUGHES, Richard Hugh.—Improvements in supplying fresh air to mines.

"In carrying out my invention the air to be supplied is collected " in a suitable reservoir or reservoirs adapted to force air there- " from when required, by suitable pipes or conduits, to the " different parts of the mine or other place requiring fresh air. " And I prefer for the reservoirs apparatus similar to gas holders " of gas works, having a moveable upper part or dome, and water " or flexible or other suitable joints."

"The air may be conducted down the mine and into various " chambers or passages thereof, or to such other place as desired, " by pipes or other ways, with outlets at various places capable of " being closed."

"The fresh air may, when desired, be dried in its passage from " the reservoir by passing through channels or chambers heated " by a furnace, furnaces, or otherwise."

[Printed, 4*d*. No Drawings.]

A.D. 1860, December 15.—Nº 3082.

COLWELL, Charles.—(*Provisional protection refused.*)—" Pre- " venting explosions in coal mines and other places."

"To neutralize the carburetted hydrogen and other gases tend- " ing to create such explosions by a certain liberal supply of " atmospheric air, to be continuously applied to all parts of the " mines and other places affected, which has never yet been " done."

[*Printed, 4d.* No Drawings.]

A.D. 1860, December 15.—N° 3087.

WILLIAMS, John Griffith.—" Improvements in extracting " inflammable and other noxious gases from coal and other " mines."

"It is proposed to convey a ramification of pipes into the " several workings of the mine, and to connect such pipes with " suitable appliances for exhausting or extracting, by machinery " or otherwise, the gases from the said workings. The gases so " exhausted or extracted from the mine may be either discharged " into the atmosphere or consumed.

"When it is desired to extract the light and inflammable gases " from the 'goafs' or workings, ascending branch pipes are fitted " into the main pipes, such branch pipes rising to the top of the " 'goafs' or cavities in the upper parts of the workings."

[Printed, 10*d*. Drawing.]

A.D. 1860, December 24.—N° 3159.

NORTON, James Lee. — " Improvements in apparatus for " drying wheat, barley, and other grain and seeds." Within a casing are enclosed an upper and an under endless apron formed of wire cloth suported by endless chains passing round rollers; the lower apron extends beyond the upper one in order that the grain may fall on to the lower apron and be carried back to a recess in the chamber. More than two endless aprons may be used. The aprons are made of wire cloth in order to allow streams of air to pass freely through them, and they work in a horizontal position, or nearly so. Above one end of the upper apron is a hopper, into which the grain is constantly fed from the recess at the lower part of the chamber by means of an endless chain or a series of buckets which descend into the recess, carry up the grain, and again and again deposit it into the upper part of the hopper in which there is a rotating stirrer. A sliding door at the lower part of the recess allows the grain to flow off when dried, and there is a sliding door over the upper apron for feeding on a fresh charge. Streams of air, cold or heated, are caused to circulate freely through the aprons and amongst the grain by means of a fan, which may be arranged to force or to withdraw the air; or heated air may be allowed to rise up from below through the chamber. The whole combination *may either be fixed* or mounted on wheels. In the particular form shewn in the drawing the air is heated by being forced by a fan through a number of tubes surrounded by steam, and thence into the casing containing the aprons.

[Printed, 6*d*. Drawing.]

1861.

A.D. 1861, January 2.—N° 6.

COOKE, William.—" Improvements in apparatus for ven-" tilating." To the top of the window sash of the room to be ventilated is hinged a plate of perforated metal, or wire gauze, the free end of which slides in and out of a "socket" or double piece of metal, plain or similarly perforated and hinged to the opening in which the window is placed outside. As the window is drawn down the hinged end of the perforated plate is drawn down with it, and the free end slides outwards in the socket, so as to occupy an inclined position and fill up the open space.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1861, January 3.—N° 14.

FULLER, William Coles, JAQUES, James Archibald, and FANSHAWE, John Americus.—" Improvements in the " adaptation of india-rubber and analogous gums and compounds " thereof to valves, pumps, buckets, packing, and other parts of " steam, water, air, and gas engines and apparatus."

" For stop valves used by plumbers and engineers in certain " parts of water, steam, and other apparatus, we form a disc of " hard rubber, with a thin surface of the elastic material united " thereto. Such valves may be moulded separately, or cut out " from junction sheet rubber prepared for that purpose. Air " valves for pneumatic railways, for hot blast furnaces, for the " ventilation of mines, and similar purposes where heat and other " atmospheric changes are injurious to leather, may be con-" structed of junction rubber, and will be found both effective " *and durable.*"

[*Printed*, 8*d*. Drawing.]

A.D. 1861, January 4.—N° 22.

PIMONT, Prosper.—"Improvements in apparatus for drying " fabrics," principally woollens and wool; but also grain and other substances.

The apparatus consists of a "chamber divided into compart- " ments, in each of which are fixed pairs of rails at different " elevations for the purpose of bearing carriages, on which are " placed frames" containing the articles to be dried. These rails extend out of the chamber to a distance at least equal to the width of the apparatus, so that the attendant can draw out the carriages as required in order to set on and remove the frames. The rails are inclined so as "to give the carriage a tendency to " pass into its compartment of the chamber with the frame or tier " of frames placed upon it."

As alternatives, the rails may also be arranged longitudinally with the apparatus, and a second pair may also be used.

The frames have a bottom of openwork or of perforated plate. "The compartments are permanently closed at the back and " ends, but are closed when required in front" by "covered " hurdles or flaps swinging on pivots fixed to the frame of the " chamber." The heat is applied through a main pipe with branches leading to each compartment, and the air may be either simply admitted or forced in by fans, or steam may be admitted. Outlets for the air are provided at the back of the chamber; or inverted cones may be placed in the arched top of the chamber.

"In order that the apparatus may be applicable to drying wool " in handfuls or in skeins, sashes" "may be substituted for the " frames, such sashes having on them a series of upright stems " with cross wires for carrying the handfuls of wool; and for " skeins a cross piece has a series of upright stems, through the " top of each of which a small rod is passed on which the skeins " are suspended. Or the sash has a series of upright stems on it, " each having a notch at the top, in two of which notches is " inserted a small" rod containing skeins.

Instead of the rails and carriages, frames are introduced into the different compartments constructed in the form of drawers, to be slidden in and out. The bottom of these drawers is formed of openwork. "A serpentine pipe or set of pipes is applied to the " lower part of the compartment, and also at or near the centre " thereof, by which heat is conveyed to the compartment." At the upper part of the chamber is a chimney to regulate the draft and carry off vapours, and there are also outlets for the escape of the water formed by condensation. The air is admitted through passages at the lower part of the apparatus, or it may be forced in at any other part. This form is stated to be applicable to grain.

[Printed, 8*d*. Drawing.]

A.D. 1861, January 9.—N° 53.

TAYLOR, William.—" A combined heating and ventilating " pipe."

" My invention consists of a pipe made in any shape or form, " and of any length or size, and of any kind of material that is " suitable, such as cast, malleable, or sheet iron, copper, tin, zinc " or anything that will contain heated water, steam, or gas, &c., " and having in it at least two compartments so as to contain one " part hot water, steam, gas, or any other heating medium, and " the other is an air chamber or compartment."

" The air chamber can be made or divided into as many com- " partments as is required. Each air chamber has an inlet to " admit the fresh air, and an outlet to convey or distribute it " where required."

[Printed, 6*d*. Drawings.]

A.D. 1861, January 17.—N° 133.

LEWINGDON, George.—" Improvements in ventilating cowls."

" My improved cowls are composed of two main parts. The " lower part is fixed, and the upper part is free to revolve round " a pin or stud supported by the lower part. On the lower part " I fit a conical ring or collar, with conical apertures leading from " the bottom of the collar into the inside of the channel in com- " munication with or in continuation of the chimney or shaft on " which the cowl is placed.

" The moveable part is formed at top with a lobster back, and " carries near the top and across the interior a shaft with two or " more fan blades, which are made to revolve by a screw wheel " fixed on the same shaft and on the outside of the cowl, which " is made to revolve by the wind.

" Just below the fan shaft I place a guard, which extends " across about one half of the interior of this upper part of the " cowl."

[Printed, 6*d*. Drawing.]

A.D. 1861, January 28.—Nº 224.

NEWTON, William Edward. — (*A communication from Frederick William Partz.*)—Apparatus for exhausting air and producing air blasts, applicable for removing noxious air or gases from a room. It "consists in producing a permanent current " of air by continuously subjecting volumes of air to the pressure " of columns of water or other fluid by means of a wheel or " cylinder partially immersed in the fluid, and revolving on a " horizontal axis, which wheel or cylinder is divided into con- " volute compartments so arranged that with each revolution they " alternately take in through openings at the periphery volumes " of air and of fluid, both of which are forced by hydrostatic " pressure to the centre of the wheel, and are discharged through " a hollow shaft into an adjacent chamber, whence the fluid flows " back to its source through an opening near the bottom thereof " into the first chamber, while the compressed air passes out " under pressure through an opening or a pipe adapted to the air " chamber for the purpose."

[Printed, 8*d*. Drawing.]

A.D. 1861, February 14.—Nº 378.

RIMMEL, Eugène.—"A new process for impregnating the " atmosphere with perfuming or purifying vapours." Liquids are used composed of essential oils and alcohol, or of perfumed alcohol alone, mixed with about ten times their weight of water distilled from flowers, such as rose water; or mixtures of essential oils or alcoholic perfumes with water distilled or not; or alcoholic perfumes or liquids saturated with purifying or medicinal substances. These mixtures are poured into a flat saucer-shaped evaporating pan, under which is a heating apparatus, such as a candle, a spirit or other lamp. The pan is placed on a stand, and it has a lamp or a candle underneath. An evaporating pan may also be fixed by means of a supporter above a candle or a lamp. The perfumed vapour escapes through apertures in the lid. A double apparatus is formed with a water bath heated by a spirit lamp. Within the upper basin containing the perfume is a curved pipe for conveying the steam from the bath heated directly by the spirit lamp into the upper basin. When intended to send a current of perfumed steam in a determinate direction as for strongly impregnating or disinfecting any substance, the outlet of the apparatus is provided with a tube, and its cover with a safety valve.

[Printed, 6*d*. Drawing.]

A.D. 1861, February 27.—N° 503.

STEVENS, Charles.—(*A communication from Mr. Desanges.*)—(*Provisional protection only.*)—Improvements in ventilation. At the top of the building a chamber is constructed into which all the chimneys discharge their smoke; an air chamber may be placed in close contact with this chamber and " may be used for " ventilating the apartments or even cesspools on account of its " high temperature."

[Printed, 4*d*. No Drawings.]

A.D. 1861, March 2.—N° 540.

CHAUSSENOT, Jacques Bernard.—(*Provisional protection only.*)—Improvement in apparatus for drawing off foul air and assisting ventilation.

" This apparatus is composed of a cylinder placed internally, " open at the side; before this lateral opening another cylinder " is placed at a distance from the opening, and two straight " pieces are placed right and left of the space left between the " two cylinders. Another large piece or vane is fixed to the " exterior of the cylinder on the side opposite to the opening, in " such wise that the wind will cause this opening to be just " opposite to the direction of the wind. The apparatus is pro" vided with a cover, upon the top of which is a valve held in a " socket fixed to the cover; this valve rests on the extremity of " a stem firmly fixed by two cross-bars on the end of the pipe " communicating with the chimney or place to be ventilated."

[Printed, 4*d*. No Drawings.]

A.D. 1861, March 14.—N° 630.

GAMMON, Charles.—" My invention relates to a particular " form of ventilator which I propose to use for ventilating rooms, " chambers, buildings, carriages, or other close compartments, " and consists of a box or case composed of any suitable material, " *preferably of* zinc; the outer side or face of this box is per-

" forated with small apertures, or formed of wire or network.
" The inner side or face is divided into a series of rectangular or
" other shaped spaces, each alternate one being perforated or of
" open network; the edges of this face are turned over so as to
" form guides or grooves within which a cover or shutter slides."

This cover is perforated in a similar manner to the case and slides on it, so that its perforated portions come over the perforated portions of the case and allow the air to enter or come over the closed portions and so exclude the air.

[Printed, 8*d*. Drawing.]

A.D. 1861, March 30.—N° 782.

SIMONS, William.—(*Provisional protection only.*)—Improvements in ventilating ships, consisting in making "a vessel's
" iron mooring bits hollow, and with suitable communications
" with the cabin or hold, so as to act as ventilators, being pro-
" vided with adjustable water-tight covers. Similarly pall bits
" and other bits passing through a vessel's deck, covering board,
" or waterway may be adapted to act as ventilators."

[Printed, 4*d*. No Drawings.]

A.D. 1861, April 9.—N° 867.

PROSSER, Henry Griffiths.—Improvements in ventilating cargoes of grain in ship's holds.

" I propose to carry through the ship's hold, both vertically
" and longitudinally, a series of metallic tubes, preferably formed
" of metal; these I dispose or arrange so as to form the skeleton
" or framework of a series of compartments, each vertical and
" horizontal tubes communicating with each other, and all being
" in communication with one or more main vertical tubes which
" terminate upon the deck; the whole of the tubes have their
" peripheries perforated with small holes; each of the aforesaid
" tubes I encase with another tube formed of wire gauze, or of
" network, and so arranged as to leave a space between the outer
" periphery of the perforated tube and the inner wire tube."

The foul air which may be formed from the fermentation of the grain will enter the wire gauze tubes and from thence pass into the metal tubes and be conveyed away. Air may be forced down the metal tubes and pass thence through the gauze tubes into the grain.

[Printed, 6*d*. Drawing.]

A.D. 1861, April 20.—N° 986.

SMITH, Aaron.—(*Provisional protection only.*)—" My invention consists of a metal tube carried up through the roof of a " forge or other building requiring ventilation, which metal tube " turns at right angles at the top and terminates in a trumpet " mouth. The tube is kept in position by stay rods; these are " attached to the tube by a loose collar, which must not interfere " with the rotating action of the tube. This rotating action is " obtained or worked by a bevil wheel surrounding the tube " horizontally inside or under the roof of the forge, with a spur " wheel and winch to drive the same, consequently by turning " the tube so that the trumpet mouth always faces the wind, a " supply of fresh air is thrown into the forge."

[Printed, 4*d*. No Drawings.]

A.D. 1861, May 11.—N° 1205.

CLARK, William.—(*A communication from John Theodore Scholl.*)—Improvements in the ventilation of life boats. The life boat is of a cylindrical form with pointed ends; air is admitted through a number of openings in the top and sides which are kept closed by springs, but which are opened when out of the water in the following manner:—In the inside of the cylinder is a carriage in which the passengers sit which is mounted on rollers so as to revolve inside the cylindrical hull and retain a vertical " position as the hull rolls; on the upper part of the carriage is a " projection or cam which presses on these valves which are out of the water and opens them.

[Printed, 1*s*. Drawing.]

A.D. 1861, May 23.—N° 1308.

TEBBUTT, William.—Improvements in ventilating dwelling houses, &c. A horizontal pipe open at each end is fixed in the basement of the house from side to side; the ends are covered with a grating, and in the centre is placed a chamber divided by a cross partition into two parts; to the upper part of this chamber is fixed a pipe through which the air rises, and passes out at the roof of the house; at each storey is fixed a chamber similar *to that below* communicating by pipes with the ceiling of each room so that the air from each room enters the pipe and is conveyed away.

[Printed, 10*d*. Drawing.]

A.D. 1861, May 24.—N° 1314.

BATTY, Charles.—Improvements in ventilation. The external air is conveyed by means of pipes "to a chamber constructed "round the grate where it is heated."

"The air thus heated is admitted and directed by suitable "apertures or valves into the room to warm the same, and causes "a true circulation, thus all the bad or vitiated air may be con-"ducted into the chimney by an escape or vent valve placed at or "near the ceiling of the room. To prevent the air being burnt "in the heating chamber, the grate is made of iron, cased with "Stourbridge clay or tiles."

"The heated chamber may be made to communicate with the "other rooms in a building, and supply them with pure warm "air, the surplus and vitiated atmosphere being conducted into "the chimney."

[Printed, 1*s*. Drawings.]

A.D. 1861, June 3.—N° 1386.

PENRICE, Herbert Newton.—Improvements in ventilating tunnels and galleries when in course of formation.

"The waste steam from the engines and the products of com-"bustion from the furnace are conveyed away from the engines "and boiler furnace by a suitable pipe supported near the roof "of the tunnel, and communicating with the outer air which "arrangement will greatly aid in ventilating the tunnel or gallery, "but it is preferred in addition to the use of the exhaust steam "and the products from the furnace for carrying off the air near "the engine and boiler (by which air from the exterior of the "tunnel is induced to rush through the tunnel towards the "further end thereof where the engine is situated) to employ a "fan or fans exhausting machinery to aid in removing the air "in the pipe above-mentioned; and it may in some cases be "found desirable to provide for drawing air by a fan or fans or "suitable mechanism from the outer atmosphere in order to "insure the tunnel or gallery being well ventilated."

[Printed, 1*s*. 10*d*. Drawings.]

A.D. 1861, June 6.—N° 1435.

HEWETT, Edward—(*Provisional protection only.*)

" My invention of improvements in apparatus for promoting " or increasing draughts for ventilation and other purposes, " consists in the application of screw blades or vanes in suitable " channels, which, by their rotation, propel the air through such " channels."

" For the ventilation of mines, I simply apply this screw in the " upcast shaft, or in a channel in communication therewith, and " cause it to rotate by any suitable power; its motion creates " a current of air, which continues its straight course through " the screw blades and channel in which they are placed. The " screw blades may also be applied to force the air into the mine; " or it may be a chamber for the purposes of ventilation instead " of effecting it by exhaustion."

[Printed, 4*d*. No Drawings.]

A.D. 1861, June 13.—N° 1520.

ILLINGWORTH, Jonas.—Improvements in ventilating sizing houses, brew-houses, and other houses and buildings.

" The object of part of the improvements is to cause the steam " employed in various processes to pass freely away from the " apartment or chamber in which it is employed. For this purpose I form all parts of the roof and flooring where the steam " is produced or set free as air-tight as possible, and also by its " thickness or otherwise, so as to avoid the conduction of cold " within. I admit all the air required from the lower part of the " room. I apply pipes, chimneys, or other ventilators rising " above the roof to a considerable height, say from 2 to 40 feet, " formed to prevent the admission of rain, and yet allow the " free escape of the steam, and so that any moisture formed by " condensation on the ventilators may be readily conducted " away."

Printed, 1*s*. 4*d*. Drawings.]

A.D. 1861, June 20.—N° 1586.

DE MENONVILLE, Michel Francois Antoine Thibault.—" Improvements in apparatus for ventilating furnaces, drying " rooms, stables, kitchens, and other places." " The ventilator " *consists of* a window, the panes of which are set in a frame of zinc or other suitable metal, and in one or more of which a fan ventilator is fixed; round the sides of the window a deep zinc frame is fixed, having at the bottom two or more small holes to admit of the water escaping which is formed by the steam and other vapour condensing by coming in contact with the metal sides which are cold from exposure to the outer air."

[Printed, 6*d*. Drawing.]

A.D. 1861, June 25.—N° 1627.

BROWN, JOHN.—(*Provisional protection only.*)—"Improvements in window frames and blinds" for the purposes of ventilation. At the top of the window frame in the keystone is made an opening which is covered with "louvres," and which communicates with the room by openings covered with wire gauze; a frame covered with gauze is attached to the upper part of the window and slides into this chamber when the window is closed, but which covers the opening left by the window when let down. A similar frame is attached to the bottom of the lower sash.

[Printed, 4*d*. No Drawings.]

A.D. 1861, June 26.—N° 1629.

WENTON, STEPHEN.—"Improvements in ventilating apparatus."

"For the purpose of carrying out my invention, I prefer to arrange a series of louvres or strips of wood, glass, metal, or other suitable material in a frame either vertically or horizontally. One end of each of such louvres or strips has a central pin or axis formed thereon or attached thereto, and capable of turning freely in one side of such frame; the other end of each louvre has two pins or projections formed thereon or attached thereto; these pins enter into holes formed in two parallel bars, which are connected by pins or otherwise to one or more toothed pinions supported on axes carried by the frame. A toothed rack formed on a rod, capable of sliding to and fro, is employed to give motion to the toothed pinions, by which each louvre may be caused to make half a revolution on its axis so as to place them at any angle in order to conduct the air in any desired drection, and one part of my improvements consists in bevelling the edges of each louvre, so that when the ventilator is

" closed and the bevilled edges come together, they present one " uniform level surface in place of overlapping."

[Printed, 10*d*. Drawing.]

A.D. 1861, June 27.—N° 1645. (* *)

HAMER, Henry.—" Improvements in chimney tops and ven- " tilators."

" This invention has for its objects the prevention or cure of " smoky chimnies and the ventilation of rooms, and the improve- " ments consist in arranging and constructing apparatus with " flanges and openings or apertures in such manner that down- " ward currents of wind will be reversed or diverted when coming " in contact therewith, and caused to ascend instead of descending " the chimney or ventilating shaft, thus tending to increase the " draught."

[Printed, 10*d*. Drawings.]

A.D. 1861, July 13.—N° 1760.

RYDILL, George. — (*Provisional protection only.*)—Improvements in ventilating mines, buildings, &c., consisting in injecting water into the pipes or flues which are used for ventilation, " water springers hot or cold being used, which is conveyed from " the boiler by means of a pipe or pipes. Jets of water are " apparently designated under the term springers."

" Coal mines, railway tunnels, and mineral mines of every " description can be ventilated by the means of water springers " in the same way, causing the water that now exists in coal " mines to become useful and valuable by causing a draft to be " obtained with safety in any portion of the pit, and by having a " supply of water at the top or from any other elevated position, " conducting the same down by means of a pipe or pipes." [Dust from rag machines and shakers can be laid in the same way.]

[Printed, 4*d*. No Drawings.]

A.D. 1861, July 16.—N° 1786.

GOUCHER, John.—(*Provisional protection not allowed.*)—Improvements in ventilating corn stacks.

" My invention consists in stacking corn in such manner as to " *have a passage* or passages up through the stack for the circu-

" lation of air. I prefer to form a hollow or skeleton frame, upon " and against which the corn or other crop is stacked, and to fix " the foundation frame at a distance from the ground, to allow of " free circulation of air under and up through the stack."

[Printed, 4*d*. No Drawings.]

A.D. 1861, July 17.—N° 1796.

BUTTERWORTH, Joseph Heape.—(*A communication from Jérôme Eugène Tourné.*)—The Final Specification was filed by John Butterworth and Henry Heape Butterworth, the executors of Joseph Heape Butterworth.

"An improved mode of and apparatus for heating air, or for " desiccating wet or moist substances." The apparatus for heating the air consists of a vessel, similar to a multitubular boiler, containing a number of tubes surrounded with an alloy fusible at a low temperature, and kept in a state of fusion. Through the tubes air is forced by a fan into the drying chambers. The substances to be dried are carried on "metallic cloth carriers" through the drying chambers, which are provided with inclined bottoms for the escape of aqueous vapours, beneath which the heated air is admitted. They may be connected by flexible or rigid joints. Different forms of apparatus for heating air are shewn in the drawings. In one of them the tubes are taken straight through the vessel containing the alloy, and are bent at right angles for the inlet and outlet of the air; in another form, instead of being led straight through the vessel containing the alloy, they are taken circuitously through it. Or the air is made to pass circuitously through straight tubes, which are arranged in stages separated from each other by plates. A number of air heaters may also be disposed above one furnace.

[Printed, 10*d*. Drawing.]

A.D. 1861, July 22.—N° 1841.

BEATTIE, Joseph.—Improvements in ventilating buildings.

"I place in or between, or connect with the brickwork or other " material of which the main building is composed, one or more " main pipe or pipes, of suitable metal and of sufficient strength " and bore, from the basement or ground floor to the roof or other " part or parts of such building, and I have branch pipes, of " suitable metal, bore, and strength, from such main pipe or " pipes into such floor, and, if required, into each room, and I

" carry such branch pipes round the ceiling or other part or parts " of such rooms and other parts of the building."

These pipes are sometimes used for conveying water to any room which may be on fire, and are also used for ventilation, air being driven or exhausted through them by steam or other power.

[Printed, 2*s*. 6*d*. Drawings.]

A.D. 1861, August 14.—No. 2026.

WILDS, William. — " Improvements in apparatus for ven- " tilating."

" My apparatus for ventilating, constructed according to this " invention, consists of a box or case, the bottom of which is " formed of woven wire, perforated metal, or like reticulated or " perforated material, and at top are fitted flaps or lids, by which " it is opened and closed, and which are connected by cords, " chains or like agents passing over pulleys to a suspended " balance weight."

" My apparatus is fixed at the ceiling or the roof of the room " or place to be ventilated, in such manner that air may pass " through it when open to or from such room or place, commu- " nication being provided between it and the atmosphere, which " may be conveniently done; for example, when the ventilator " opens under another floor, by providing a grating, air-brick, " or opening at one or both ends of the air trunk formed " between the joists; or it may be effected otherwise to suit the " construction of the building."

[Printed, 8*d*. Drawing.]

A.D. 1861, August 19.—N° 2055.

ROBB, John.—(*Provisional protection only.*)—" Improvements " in ventilating."

"The principle adopted is that of admitting the necessary " supply of fresh air at a low level, and carrying off the heated " and vitiated air at a higher level."

" In ordinary cases the method employed is to provide an open- " ing at the bottom of the windows for the ingress of fresh air " and a similar opening at the top or upper part of the windows " *for the escape* of the heated and vitiated air, such openings

" being covered with perforated card, paper, gauze, cloth, or " other perforated material."

[Printed, 4*d*. No Drawings.]

A.D. 1861, August 24.—N° 2117.

CRANSTON, James. — Improvements in the ventilation of buildings formed of wood and glass for horticultural and other purposes.

The roofs of these buildings are formed on "radial pieces," which consist of horizontal pieces of wood set on their edges parallel to the ridge of the roof at different heights from the ledge, to these are attached the roof, the rafters of which are fixed to the bottom of one radial piece and the top of that below it, so as to form a series of short roofs lapping over each other.

"The 'radial pieces' have circles, trefoils, quarterfoils, or " small openings of any shapes pierced through them at equal or " unequal distances, either all along or partly along their lengths, " for the ventilation of the buildings, the insides of the 'radial " 'pieces' so pierced have valvular slides with friction rollers at " the edges made to run in grooves."

[Printed, 8*d*. Drawings.]

A.D. 1861, August 26.—N° 2120.

JONES, Robert Watkin. — Improvements in heating and ventilating air baths, consisting in interposing between the top of the heating flues and the floor of the rooms a shallow chamber, through which a current of air will flow and will serve to keep the floor cool, and also to supply the bath rooms with pure warm air combined with a certain amount of vapour.

[Printed, 8*d*. Drawing.]

A.D. 1861, September 6.—N° 2235.

MESSENGER, Thomas Goode.—Improvements in ventilating horticultural buildings.

The rafters are made with a gutter or hollow in their outer surfaces, which serves to carry off the rain, and also "the con- " densed vapours from the interior." The glass plates are made with their edges turned downward, and are laid with these edges projecting into the gutter, being held in that position by a plate screwed down from above.

[Printed, 6*d*. Drawing.]

A.D. 1861, September 19.—Nº 2343.

SILVER, THOMAS, and MOORE, THOMAS.—(*Provisional protection only.*)—Improvements in ventilating ships.

" This we propose to do by inserting trap valves in the decks " communicating with pipes carrying the foul air below, where it " will be forced upwards from the bottom of the ship, and taken " up through pipes through the floors, and extending above the " upper deck. The carbonic acids, which contaminate the " atmosphere through the impossibility of their escaping, will be " allowed to descend, as it is their nature to do, and be carried " by the upward draught of the ventilating pipes in the bottom " of the ship. The trap opening will be covered by gratings. " The trap valves will be made self-acting floats to close up in the " event of water rising underneath. The tops of the ventilating " pipes above the upper deck to be in the form of a cap cone " fashioned to increase the draft."

[Printed, 4*d*. No Drawings.]

A.D. 1861, September 21.—Nº 2361.

BODMER, LOUIS RUDOLPH.—(*Provisional protection only.*)—Improvements in ventilating rooms in which gas burners are applied.

" The gas burners may be placed vertically as in ordinary gas " lights, but I prefer to use the star-shaped gasaliers with hori- " zontal burners. The gas pipe, to the end of which the star is " fixed, is placed within a second pipe or tube of larger diameter, " and this second tube is the ventilating tube which carries off " the products of combustion, sufficient space being left between " the two tubes for their rapid escape. The upper end of the " ventilating tube may pass through the roof into the open air, " where it is covered with a suitable cowl or hood to prevent " back draught, or it may terminate between the ceiling and the " floor above it, and enter into a flue leading to the open air, the " chimney, or some suitable part of the building."

[Printed, 4*d*. No Drawings.]

A.D. 1861, September 30.—Nº 2436.

PENNYCOOK, CHARLES HILL.—(*Provisional protection only.*) —"*Improvements* in chimney hoods and ventilators."

The apparatus consists "of a cylindrical shell formed or divided "internally so as to present one or more helical or screw-shaped "passages, and mounted upon an upright spindle, so as to revolve "as freely as possible."

"A cap is attached to the drum or cylinder at a slight distance "above it, the smoke having free egress laterally or radially between the two. The revolving cylinder and cap are both formed "with external pocket-like vanes, having the sides inclined, but "with no openings through into the interior, as with vaned hoods "hitherto constructed. The slightest external air current, by "acting on the vanes, causes the hood to revolve, and the vanes "being set in a suitable direction relatively to the internal screw, "the latter in turning exerts an upward drawing or propelling "action on the smoke."

[Printed, 4*d*. No Drawings.]

A.D. 1861, October 9.—N° 2518. (* *)

WALKER, James.—(*Provisional protection only.*)—"An im"proved chimney top, cap or cowl, for the prevention of the "descent of sooty exhalations, curing of smoky chimneys, and "ventilation of apartments."

"1. The construction of pots, cowls, or wind guards, full of "small holes or slits, so that the wind when bounding against "the pot has its force broken up and is minutely subdivided, so "that in mixing with the heated air within the pot it accelerates "the expulsion of the same.

"2. To prevent downward draughts, and to facilitate the ex"pulsion of the smoke, I add to the above pot an elastic top "which bends over with the force of the wind, and re-adjusts "itself when the wind ceases, which constant motion also prevents "the soot being deposited."

[Printed, 4*d*. No Drawings.]

A.D. 1861, October 19.—N° 2615.

WAINWRIGHT, John.—(*Provisional protection only.*)—"Im"provements in ventilating rooms and buildings," being improvements on a Patent granted to the same patentee on the 20th October 1858, and consisting, "first, in perforating the lower "bar of the lower sash of window frames, and in fitting over the "same inside the window a slide made with perforations and

" solid parts, in such manner that the perforations in and solid " parts of the slide may be brought entirely or partially over the " apertures in the sash bar. Again, in some cases, I receive the " air in a case or trough through apertures in the lower sash bar, " and carry tubes up the side frames, which communicate with " the air case; and I provide outlets in the tubes at various " levels. The upper sash frame remains as described in the " Specification of my former Patent. I apply the arrangements " before described to doors and to any other parts of buildings " where it may be desirable to introduce air for ventilating " purposes."

[Printed, *4d.* No Drawings.]

A.D. 1861, October 29.—N° 2704.

MARTIN, JOSEPH.—(*Provisional protection only.*)—" Improve" ments in granaries and the apparatus connected therewith." In combination are a number of vertical chambers supported upon arches or metal girders, and above the top of which the grain to be stored is carried by elevators. From the buckets of the elevator the grain falls into a hopper, provided with a swivelling discharge pipe, from which it falls into the chamber over which it is placed. Or the grain falls into a spout fitted with an archimedian screw, by the rotation of which it is carried forward to the part required. Or the screw can be a fixture, and the external casing made to rotate. The grain is discharged from the vertical chambers through openings in their bottoms and in the arch, where it can be received in bags. Where it is required to agitate the grain, it is proposed to allow it to discharge itself from the bottom of the chambers and fall into a spout fitted with a longitudinal screw, as before described, which conveys the grain to the elevators. It is thence raised to the hopper on the top of the chamber and reconveyed to the same chamber from which it was withdrawn, or to any other chamber in the stack. And it is further proposed to apply an exhaust or fan blast of heated or cold air into the elevator casing to act on the grain during its passage upwards.

[Printed, *4d.* No Drawings.]

A.D. 1861, November 12.—N° 2838.

COOKE, WILLIAM.—(*Provisional protection only.*)—Improvements in ventilating carriages, consisting in " the adaptation and

" application to carriage or other windows, or such like openings, " of wire gauze or other perforated material, so arranged as to " form a series of folds extending and contracting at pleasure."

" For this purpose I construct a framework of suitable size and " material to the window or opening, to which the perforated " material is to be applied, and fix therein in a suitable manner " the folds or slabs of wire gauze or other suitable material. The " apparatus can be so arranged that it may be brought into use " or disconnected by the movement of the window, and so that " when the window is drawn down it brings the ventilator with " it as far as a certain point, but as the window is drawn below " such point the ventilator ascends by the descending action of " the window or sash, and may again be brought into use by " closing and opening the window."

[Printed, *4d.* No Drawings.]

A.D. 1861, November 14.—N° 2872.

HAWKSLEY, GEORGE.—(*Provisional protection only.*)—" Improvements in actuating ventilators."

" A strip of metal, which expands freely with heat, by prefer- " ence of zinc, is attached at one end to a screw or other instru- " ment, which is capable of being moved or adjusted; the other " end of the rod is attached to the shorter end of a lever mounted " to a fixed centre, and to the longer end of which is attached " one end of another expansion strip, and the other end of this " second strip is attached to the shorter end of a second lever, " which in turn has a third expansion strip attached to it, and so " on, the number of the strips employed depending on the degree " of delicacy required in the instrument."

" The last of the series of levers carries the instrument which " acts on the former apparatus for working the ventilator."

[Printed, *4d.* No Drawings.]

A.D. 1861, November 15.—N° 2874.

MINCHIN, CHARLES HENRY.— (*Provisional protection only.*) —" Improvements in ventilators for railway and other carriages."

" At the top of the aperture for the window sash, and behind " the grooves in which the sash slides, I place one or more strips " of wire or silk gauze, jointed together so that they can be " folded or opened out, the top strip being held by pivots " working in bearings, fixed to the frame."

" When the sash is placed in its lowest position, the strips of " gauze are closely folded together to allow the aperture to be of " the largest dimensions, but as the sash is being raised the strips " gradually unfold until they meet the sash and cause the " bevilled edges of the sash and bottom strip of the folds to be in " contact. As the sash is still further raised it lifts the strips, " closing them one after the other, by which means any amount " of ventilation can be obtained."

[Printed, 4*d.* No Drawings.]

A.D. 1861, November 15.—N° 2875.

NIXON, John.—Improvements in ventilating coal and other mines, consisting " in the arrangement of rectilinear ventilating " pistons in such a way that they can work in correspondingly " formed air chambers in a horizontal manner. These pistons " are supported on rollers or wheels, which travel on a railway, " tramroad, or other metallic surface. The pistons are attached " to the motive power by friction and connecting rods in the usual " mode. The air chambers can be constructed of wood, iron, or " masonry, or of each or all of them combined or conjointly. " The pistons can be made air-tight by leather or other packing, " or by being sufficiently accurately fitted to the size of the air " chambers as to render such packing unnecessary. These air " chambers are fitted with intake and outstroke valves."

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1861, November 27.—N° 2982.

RYDILL, George.—(*Provisional protection only.*)—Improvements in producing a draught in air pipes for ventilation and other purposes, consisting in injecting into the air pipes " water " springers " or jets of hot or cold water, the velocity of which is imparted to the air and produces a draught. By this method of creating a draught any place whatsoever may be ventilated, smoke will thereby be condensed, and dust arising from any machines or factories collected and carried away.

[Printed, 4*d.* No Drawings.]

A.D. 1861, November 27.—N° 2985.

WHIBLEY, Amos, and LUMLEY, Thomas. — (*Provisional protection only.*)

" This invention consists in constructing the louvres of ven-
" tilators of oiled silk, cotton, cloth, or other suitable flexible
" material instead of wood or metal as heretofore commonly
" practised. For example, we take a sheet of zinc, iron, wood,
" or other suitable material, and pierce in it a convenient number
" of holes, and to the top of this plate, and on one side of said
" plate, we fix a piece of oiled silk, cotton, cloth, or other suit-
" able flexible material, so that it shall hang over and cover one
" side of the plate, so that a current of air blowing on that side
" of the plate which is not covered with the silk will pass through
" the holes in the plate, and raising the oiled silk will be allowed
" to escape."

[Printed, 4*d*. No Drawings.]

A.D. 1861, December 31.—N° 3264.

McHAFFIE, Neil.—" Improvements in ventilators or valves
" for regulating the passage of air or other fluids."

" When applying a ventilator or valve for admission of external
" air, I cause the current of air entering to impinge on a surface
" so arranged, that when the current of air exceeds the velocity
" considered desirable the surface may be able to yield to it, and
" on yielding may close or partially close the valve; when the
" force of the current diminishes, the valve again opens, it being
" so weighted as always to tend to do so. For the passage of
" liquids this last mentioned surface should be mounted on a
" horizontal axis, but instead of being at or near its lower, its
" should be at or near its upper extremity, on account of the
" greater density of the fluid, the passage of which is sought to
" be regulated."

[Printed, 6*d*. Drawing.]

1862.

A.D. 1862, January 4.—N° 30.

ARUNDELL, James Whitton. — (*A communication from Martin Neuerburg.*)—(*Provisional protection only.*)—" An improved
" method of and apparatus for communicating motion to fan
" ventilators, particularly applicable to ventilating mines."

"My improved method consists in having a screw cut on the "axis of the fans, in which the teeth of a toothed wheel of suitable size work. The teeth of the toothed wheel are cut obliquely "and of the same pitch as the screw. The wheel must be of "sufficient size to cause the fans to revolve with the required "velocity, but the size of the wheel need not be greater than to "cause the fan to revolve ten times while the wheel revolves "once. The wheel may be driven by manual or other motive "power."

[Printed, 4*d*. No Drawings.]

A.D. 1862, January 10.—N° 73.

WIGZELL, MONTAGUE.

"My invention relates principally to ventilating railway carriages, rooms, vessels, and other compartments to which it "may be applied. It consists of two chambers, with or without "inner shutes of wirework or perforated divisions for directing "or dispersing the air and for preventing the rain from entering "the carriage or compartment, and it has an external opening in "each chamber, so that the fresh air is admitted through one "external opening into the inner space or spaces in the apparatus "and then into the carriage, room, or other compartment to "which it may be applied, and the hot or impure air is made to "pass out from the carriage or other compartment through the "other chamber or space in the ventilators, by being assisted in "its outward passage by the suction caused by the ventilator or "apparatus passing through the air, or by the air rushing past "the opening through which the hot or impure air passes out "from the carriage or other compartment to which the ventilator "is affixed."

[Printed, 6*d*. Drawing.]

A.D. 1862, February 7.—N° 328.

CLARK, WILLIAM.—(*A communication from Henri de Lapparent.*)—"Constructing the shells of vessels so as to admit of "air passing along inside the framing, in order to prevent the "stagnated heated air decomposing the timbers." "When con"structing the shells of ships in ordinary an error is committed "*in so enclosing* the frame of the vessel as to prevent any com-

" munication with the exterior air. A good method would be to " place the shell of the vessel in communication with the exterior " air by making small holes in the sides."

[Printed, 8*d*. Drawing.]

A.D. 1862, February 12.—N° 366.

ROBB, John.—Improvements in ventilation. The ventilation is effected by admitting air at the lower part and allowing it to escape at the top of the room. In applying this method to rooms already built the window is opened at top and bottom and the openings fitted with perforated card covered with india-rubber; or spaces so covered are made in the sashes. In applying it to new buildings air is admitted by glazed earthenware pipes to chambers, from which it passes into the apartment to be ventilated through openings covered with wire gauze or other perforated material.

[Printed, 4*d*. No Drawings.]

A.D. 1862, March 18.—N° 751.

DUNN, Thomas.—"Improvements in the construction of " bridges, roofs, houses, and other structures." This voluminous Specification covers thirty-six pages of printed matter, referring to one hundred and four sheets of drawings, and it embodies fifteen claims, the twelfth of which consists in " modes " of constructing gates, fences, and other similar structures, " partly applicable to ventilating ships and houses." Shop fronts are described (page 24) as provided with " ventilating " shutters or sun blinds." Fences for trees and shrubs, palisades " on the ventilating system " are alluded to (pages 27–8), with references to Sheets 78 and 80 of the Drawings. At page 29 reference is made to a gun boat, illustrated on Sheet 85, provided with " port-holes and ventilating holes." All these applications are on the general principle of the Venetian blind, except that the plates do not overlap each other.

The inventor states (page 4), that " for fences, walls, and ship " sides which require ventilation," he hinges " a series of plates " together," and attaches " a connecting rod to each plate, which " when acted on by a lever or other powerful agent, will open " and shut them at pleasure."

On Sheet 66 (Fig. 4) is shewn a shop front with shutters apparently like so many common hinged doors; but it is not indicated how they are to be opened and shut.

On Sheet 78 and 80 are shewn palisades and gates, each bar of which "has a wing or blade attached to it;" "a connecting rod " is attached to the blades to open or close any number simul- " taneously by means of a lever." Similar fences, shewn on these sheets, "are also applicable as guards to the trunks of " trees, and to shrubs."

"The sides of ships or buildings may also be furnished with " such opening and closing blades for ventilating purposes" (p. 27). The "ventilating holes" of the ships shewn on Sheets 85, 86, and 87, are merely ordinary hinged doors or shutters, apparently to be opened during action to get rid of the fumes of the powder.

[Printed, 2*l*. 13*s*. Drawings.]

A.D. 1862, March 21.—N° 782.

SIEBE, Daniel Edwards.—" Improvements in machinery or " apparatus for refrigerating or producing cold, part of which " improvements are applicable also to other purposes." They relate to an ice-making machine, the refrigerating capabilities of which may be applied to "cooling air," and to "ventilating;" though it is not specified in what manner. The machine is constructed to work on the plan of the evaporation of ether in vacuo, and its " subsequent condensation under pressure with the assis- " tance of water at an ordinary temperature." The different parts of a machine of this kind are modified in order to increase the economy of its working.

A reciprocating pump for exhausting and compressing the ether or other volatile liquid is constructed with its outlet valves to be worked by cams, the positions of which can be altered by means of the motions under pressure of pressure or vacuum gauges. Both pairs of inlet and outlet valves are made in the form of segments, to oscillate to and fro over a separate port, two at each end of the cylinder. It is stated that this form of air pump "may be made use of for various other purposes."

In the condenser for the ether, "the current of condensing " water is caused to flow in a contrary direction to that of the " *vapour* required to be condensed." The condenser is divided into two parts by a partition, the smaller division containing a tall upright tank for receiving the ether, which, on leaving the reciprocating compression pump, passes through a length of piping arranged zig-zag wise from the top to the bottom of the condenser. Boards are disposed between each bend of the piping, so that the water entering from below has to traverse between these boards and the pipes alternately to and fro to the uppermost bend, and in a direction contrary to that of the entering vapour.

In the multitubular refrigerator wherein the freezing liquid is cooled down, the tubes for receiving it are arranged vertically within a cylindrical vessel contained in an outer cistern. The brine or other liquid passes down these tubes, and thence through perforations in the bottom of the vessel into the intermediate space between it and the outer cistern, up which it flows, then off at the top into the trough for the ice moulds. The ether enters the vessel by a pipe at its bottom edge, and is drawn off by a pipe on its top cover communicating with the ether pump.

"A regulator whereby the return of the ether from the con-
" denser to the refrigerator is governed," "consists of an arrange-
" ment of float, connected by a lever," "with a tap," "whereby
" on the rising of the ether to the level allowed, a communica-
" tion is opened with, and any excess of ether passes to, the
" refrigerator."

The moulds containing the liquid to be cooled can be moved successively towards the refrigerating current as others are removed. This is done by arranging the moulds so that one or more can be removed from the end nearest the coolest end of the current of liquid, and the remaining moulds moved towards it by a screw, fresh moulds being inserted at that end of the current which has abstracted heat in its progress between the other moulds. The drawings shew a number of boxes, each containing four moulds, enclosed in a trough, set at a small angle with the horizontal level, so that the end nearest the refrigerating power is highest. The brine enters the trough by a slit formed in the under side of a tube from the refrigerator, gradually making its way to the lower end of the trough, where it is drawn off and sent back to the refrigerator by a double-acting pump.

In this case, as in that of the condenser and the refrigerator, the leading principle carried out is that of obtaining the greatest working differences of temperature in the opposing currents of fluids to be cooled or heated respectively. The drawings should be consulted.

[Printed, 1*s.* 6*d.* Drawings.]

A.D. 1862, March 25.—Nº 824.

GUIBAL, Theophile.—Improvements in fans for ventilating mines and furnaces. The fan is of the ordinary rotatory description; the orifice by which the air issues from it can be enlarged or diminished by means of a sliding screen consisting of planks united by flexible iron bands; air enters at the axis at one side of the fan only; the air is discharged into a chimney which enlarges towards the outer end.

[Printed, 1*s.* 8*d.* Drawings.]

A.D. 1862, March 28.—Nº 866.

NOUALHIER, Eugene Théodore.—"An improved venti-" lator." The ventilator, which is used to draw warm air from or to drive cold air into a building, consists of a vertical metal tube, round the top of which is fitted a second and larger tube, which covers it for some distance, leaving an annular space between them, and also extends above the top of it till it terminates in an open head, which is kept to windward or leeward as desired by a vane; the outer tube fits closely to the inner at its bottom, but a space is left between them at the top of the inner tube through which the wind rushes upward, being admitted into an open mouth which is attached to the annular part of the outer tube. By varying the relative positions of the open and closed ends of the annular space between the tubes, the wind can be directed downwards instead of upwards.

[Printed, 10*d.* Drawings.]

A.D. 1862, March 31.—Nº 893. (* *)

WOODBURY, Joseph Page.—"An improvement in arming " war vessels." The invention consists, firstly, "in providing a " hull of good model for speed with a shallow draft of water, and " of a capacity to carry coals, and machinery sufficient to excel in " speed any vessel designed to be attacked."

2. "In providing means for sinking it to the deck by water " *ballast* when going into action."

3. "In making the deck convex or circular, both longitudinally " and transversely, so that when the vessel is submerged to a " fighting trim the sides of the deck will be below water, and the " surface exposed will be presented to an enemy's shot at a low " angle, and also that the centre of the deck will be sufficiently " above water to enable the vessel to be worked in a sea way."

4. "In forming in the middle of the deck a low oblong trunk " projecting upward a short distance from the deck, and plated so " as to be secure from shot, through the sides of which small " holes are made for the purpose of observation externally, and " for the purpose of defending the deck by musketry, by ejecting " hot water, or by any other means. These holes are flared upon " the inside to permit a wider range of observation and attack, " after the manner of a loophole for musketry in fortification. " The top of the trunk is provided with several large openings " thoroughly secured by shot-proof gratings, through one of " which the smoke from the boiler emerges, and through the " others the hold is ventilated by fan blowers or otherwise. The " steering wheel is also placed within it, and from within it all " the movements of the vessel are directed."

5. The vessel is armed with three or more submarine breech-loading cannon of large calibre, and many "accessory devices" are provided "to enable the guns to be worked under such " conditions."

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1862, April 4.—N° 951.

WOODALL, John Francis.—Improvements in the ventilation of carriages. "Long narrow slits or apertures are formed in the " sides and over the doors, and in some cases in front of the " carriage close to the roof;" through these the air enters, being directed upwards by "hinged flaps or valves," and escapes through "a valvular opening" in the roof above, to which is fixed a pipe opening to the back. All the openings are covered with ornamental scroll-work.

[Printed, 10*d*. Drawing.]

A.D. 1862, April 7.—N° 980.

DUNCAN, Charles Stewart.—"An improved method of and " apparatus for ventilating, cooling, or suppressing fire in public

" and private buildings," consisting in distributing over the roof of the building a series of jets of cold water by means of perforated pipes supplied by mains from some head of water.

[Printed 4*d*. No Drawings.]

A.D. 1862, April 19.—N° 1139.

SHANKS, John.—(*Provisional protection only.*)—" Improvements in apparatus for promoting ventilation."

" In practically carrying out the invention in the case of a room " or building, for example, separate tubes or passages are provided for the inlet and outlet currents, being placed as far apart " as is convenient. The inner opening of each outlet tube is in " or near the ceiling or roof of the room or enclosed space, and " the tube is carried up to a height that its top end is considerably " above the level at which it is convenient to have the top of the " inlet tube or tubes."

To further insure the production of a current, the tubes are " fitted at their tops with caps, having their openings presented " sideways, and having vanes fitted upon them in such ways as " that in the case of the inlet the opening always presents itself to " whatever wind or external air current there may be; whilst in " the case of the outlet the opening is always presented away " from the wind."

[Printed, 4*d*. No Drawings.]

A.D. 1862, April 24.—N° 1204.

ZIMARA, Rudolf.—Improvements in warming and ventilating buildings. A furnace is constructed with a number of zig-zag flues or pipes of earthenware, through which the products of combustion pass. " Around and in contact with these heated flues or " pipes a series of passages are arranged, which communicate with " the external air and the interior of the building, where heat and " ventilation are required." " Suitable pipes or passages are " arranged for conveying the foul or vitiated air away from the " interior of the building and conducting it into the ash-pit of the " furnace or fire-place, so as to create a continuous current."

[Printed, 10*d*. Drawing.]

A.D. 1862, April 30.—N° 1284.

WILLIS, Henry.—" Improvements in valves for the supply and " *discharge of* gaseous bodies." The valves are so constructed that the pressure of the air or gas will not interfere with their free action. They are to be applied to wind organs, for ventilating buildings, and to gas regulators.

For admitting compressed air from the wind chest to the grooves of an organ a valve is used either with a vertical motion or a segmental rocking valve. For a valve with a vertical motion, there is employed an inverted cup of wood or other light material having holes in the top, or merely a tube of the same material, which dips into a cup of mercury or other fluid suitable for keeping the top of the cup, tube, or cylinder, up to its seat. For gas regulators, this improvement is applied to a modification of "Kidder's gas regulator."

For the purpose of ventilating buildings, it is to be opened or closed by a "thermometric arrangement" "according to the "temperature of the apartment which it is intended to supply "with fresh air." Instead of being moved vertically, it has a rocking motion, and has accordingly the shape of a hollow ring, of a length from about one-half of the circumference to one quarter, or a quadrant of a circle. This hollow ring is open at both ends, one of which bears on a seat, connected with the supply of air, and the other dips either into mercury or glycerine, contained in channels, so that that end of the annular tube is closed. It is carried by arms rocking on a fulcrum. It is slightly weighted at the top, where it is also connected with a rod, which, when pulled horizontally, causes the valve to rock to and fro, and open the inlet for the air. These valves may be made to act in pairs, by coupling them together by segment racks.

[Printed, 10*d*. Drawing.]

A.D. 1862, May 10.—N° 1405.

MOORE, Robert.—Improvements in ventilating ships.

"I employ for ventilating ships or vessels tubes varying in their "application according to the direction to be given to the current "of ventilation, but having for each circuit an induction and an "eduction port. The peculiarity of this arrangement is, that at "or below the eduction port is a rotating jacket or chamber with "an orifice for the admission into the chamber of atmospheric "air, which in certain cases may require to be artificially excited "for the purpose. This again communicates with an internal "tube or passage by means of apertures in the ventilator, and

" this passage leads to or nearly to the top or opening of the " eduction port with reduced space, so as to contract the exit of " air of which it is the intended channel. The orifice above " mentioned is retained in the direction opposed to the wind by " any self-acting or adjusting contrivance, and thereby a quantity " of air is admitted to the revolving jacket, which passes by " apertures into the interior channel, and is forced through its " contracted space so as to act somewhat in the nature of a " blow pipe, expelling continuously the terminal volume of " ventilation from the eduction port."

[Printed, 8*d.* Drawings.]

A.D. 1862, June 5.—N° 1692.

RYDILL, George.—" An improved hydraulic pump or engine " for raising liquids and obtaining motive power, also applicable " for the ventilation of mines, and other useful purposes." It consists of a form of large mining pump, the useful effect of which the inventor rates so high that he allows some of the water raised by his " balance syphon hydraulic motive power pump " to fall back in order to drive " water pressure engines, turbines, or rotary " motion engines down in the mine," which themselves propel " fans forcing and drawing air, enabling any part of the mine to " be " ventilated. This proposal is made in the Provisional, but is not referred to in the Final Specification.

The leading idea of the several arrangements of mining pumps here described consists in attaching, to a rod from below the pump bucket of a draw or suction lift, a solid plunger or forcer, working in a cylinder connected by means of a bent U-pipe with the rising main above. By this means a column of water is to be brought down to act on the bottom of the solid plunger. Both single and double acting pumps of this kind are shewn.

[Printed, 2*s.* 6*d.* Drawings.]

A.D. 1862, June 9.—N° 1721.

GIACHOSA, Fernando.—" Improvements in ventilating mines, " ships' holds, and other places."

" The object of my improvement is to facilitate the removal of " carbonic and other noxious and deleterious gases or vapours " from mines and other places. For this purpose I employ " *chambers* formed by covers and diaphragms or partitions, the

" surfaces of which are combined by cylinders of leather or other " suitable flexible material. The bottom of the chamber, or the " lower of a series when a series is employed, is connected by a " cylinder of leather or other suitable flexible material to a bell-" mouthed collector adapted to collect or admit of the flow of the " gases from the lowest surface where such apparatus is applied. " Motion is given by suitable mechanism to the diaphragms or " partitions to the chambers, or to one of them, to effect the " alternate expansion and contraction of the chamber or chambers for the reception of the gases and for their being forced " upwards by suitable passages in connection with such chambers " or chamber."

[Printed, 10*d*. Drawing.]

A.D. 1862, June 16.—N° 1777.

COURTILLIER, Charles Edme.—(*Provisional protection only.*)—"Improved inhaling and saturating apparatus." The apparatus consists of two parts, in one of which steam is generated by the application of a spirit lamp, &c., and in the other through which the steam passes are placed various substances of a medicinal character suited for inhaling, or of such a character as when absorbed by the steam will purify the air of the apartment into which the steam issues.

[Printed, 4*d*. No Drawings.]

A.D. 1862, June 17.—N° 1786.

CRESTADORO, Andrea.—Improvement in ventilating mines, ships, &c. "I establish my furnace outside the deck or pit, as " the case may be, so that it is placed in the open air; here the " pipe intended to feed the fire with air is made as long as will " enter the place which it is proposed to ventilate, and will extend " as far as close to its bottom or inmost recess."

[Printed, 6*d*. No Drawings.]

A.D. 1862, July 14.—N° 2027.

RIDLEY, Robert, and JONES, James Grafton.—Improvement in the ventilation of mines, &c. The ventilation is effected by means of a rotating fan which is placed above the upcast shaft and which draws in the air, which issues from the upcast shaft, at its under side.

" The periphery of the apparatus is not cylindrical, but is " formed with openings (by preference four) in planes radiating " from the centre of the apparatus. The circumference of the " apparatus is closed, except at these openings, by four curved " plates (if there be four openings or outlets), each of which plates " springs from the inner end of one opening, and passes to the " outer end of the next opening."

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1862, July 24.—N° 2105.

LEMAISTRE, Toussaint.—Improvements in ventilating and removing gases from cesspools, &c. A vertical pipe is fixed in the top of the cesspool and is carried up to the roof of the house or building; in the upper part of the pipe is fitted a revolving fan which is driven by wheelwork, and which draws the noxious gases from the cesspool and discharges them above; the wheelwork is wound up by the revolution of the handles of the doors of the privies which are discharged into the cesspool.

[Printed, 10*d.* Drawing.]

A.D. 1862, July 28.—N° 2127.

WALTON, Joseph, and MOORE, James.—Improvements in ventilating and heating buildings.

" The apparatus for carrying off vitiated air from a room or " other building is placed at the ceiling or upper part of the room " or building, and is composed of a conical tube, the larger and " lower end of which opens into the room, and the smaller end " either opens directly into the outer atmosphere or communicates " with it by a pipe; through this conical tube the vitiated air " escapes from the room or building; around the conical pipe is " a cylindrical pipe of larger diameter than the bottom of the " conical pipe, so that there is an annular space between the " bottom of the conical pipe and the bottom of the cylindrical " pipe. The upper end of the cylindrical pipe also communicates " with the outer atmosphere, and as vitiated air passes away from " the room through the conical pipe, fresh air enters the room " through the space between the bottom of the conical pipe and " the bottom of the cylindrical pipe.

" In order to supply a room, Turkish bath, or other building " with heated air, the following arrangement is employed :—

" Above a fire-place or furnace is formed an air chamber, the
" bottom of which is heated by the fire, and is formed of fire-
" bricks or tiles, by preference the fire-bricks made of pipeclay.
" Air is admitted into this chamber from other chambers formed
" at the sides of the fire-place or furnace, air being admitted into
" the front of these chambers from the outer atmosphere; the
" heated air passes away from the back of the chamber above
" the fire-place through a passage or flue, which conducts it into
" the Turkish bath or into the room or building to be heated."

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1862, August 1.—N° 2178.

SINCLAIR, JOHN.—(*Provisional protection only.*)—Improvements in ventilating buildings, hay ricks, &c. Above the door of the building is made an opening for the entrance of air; this opening is covered at the inside with a perforated case to diffuse the air. The warm air is carried off by pipes fixed at the top of the windows. For the ventilation of hay ricks and heaps of potatoes or other vegetables " ducts " or pipes perforated at the sides are built into the rick or heap and serve for the free passage of air.

[Printed, 4*d.* No Drawings.]

A.D. 1862, August 7.—N° 2212.

DE FENIS DE LACOMBE, FRANÇOIS HENRY MARIE CÔME DAMIENS, Chevalier.—Improvements in ventilating, heating, and lighting, consisting in conveying by means of pipes pure air into a town or city, and supplying it in a cold or heated state into each house or building; the air may be passed through some " napthalizing agent or volatile liquid hydrocarbon " and rendered suitable for ignition and lighting purposes.

[Printed, 4*d.* No Drawings.]

A.D. 1862, August 28.—N° 2385.

KITCHIN, JOSEPH.—(*Provisional protection only.*)—" Improve-
" ments in ventilators." The ventilator consists of a vertical pipe fitted in the centre of the roof, and surrounded by a larger pipe, which forms with the central pipe an annular channel through which the foul air flows outward, the cold air flowing inward

through the central pipe; both pipes are guarded by perforated plates and are provided with throttle valves; a hollow disc, with its concave side downwards is suspended below the central pipes and it is covered by a dome or cap.

[Printed, 4*d*. No Drawings.]

A.D. 1862, September 16.—N° 2541.

FLEXEN, Stephen.—Improvements in ventilators for railway and other carriages.

To the ordinary gauze ventilator is attached a cord or band which passes over a pulley at the top of the door.

" In a groove or passage cut in the solid portion of the frame-
" work of the door or window, I enclose a metallic or any other
" rod, counterbalance, or weight, fastened or suspended to the
" aforesaid cord, band, or chain, which passes from the ventilator
" over a pulley or roller fixed in the upper part or head of the
" frame, or in the side thereof, if made to work horizontally.
" This rod or balance weight is guided by means of an eye so
" placed, by which it rises and falls, and thus allows the sash,
" window, or otherwise, to be completely open or shut; or I use a
" catch, knot, or the like contrivance."

[Printed, 8*d*. Drawing.]

A.D. 1862, September 17.—N° 2553.

DOUGLAS, Joseph.—Improvements in ventilating chambers where cooking ranges are employed. Above the range is left an open space into which the heated air and effluvia collect; at the top of this space is a plate in which is fixed a vertical tube into which the hot air passes and flows up the chimney; a short pipe communicates with the upper part of the pipe at the top of the room and carries off the hot air which collects there.

[Printed, 8*d*. Drawing.]

A.D. 1862, October 1.—N° 2656.

HASELTINE, George.—(*A communication from Edward Young Robbins.*)—Improvements in warming and ventilating apartments. Below the floor and extending some distance up the walls of the apartment is formed a hot-air chamber which may be heated by air, water, or steam pipes; the heat of this chamber is conveyed to the apartment by conduction only, but below it is formed a shallow chamber through which cold air flows, and being moderately warmed is allowed to flow through apertures in the skirting into the lower part of the apartment.

[Printed, 8*d*. Drawing.]

A.D. 1862, October 16.—N° 2800.

ROBINSON, Joseph.—Improvements in ventilating iron ships.

" My invention in ventilating the cabins and cabin decks in " iron ships consists in carrying an air pipe down through the " upper waterway to a little above the waterway on the cabin " deck, in carrying a pipe into, or in forming an aperture or " apertures in the under plate of the upper waterway, and in " carrying pipes from the upper waterway, communicating with " a funnel or shaft." The first-mentioned pipe is provided with a cowl which can be turned to windward to admit air when desired.

[Printed, 8*d*. Drawing.]

A.D. 1862, October 16.—N° 2802. (* *)

NELSON, Edward.—" Improvements in the manufacture of " apparatus for heating and superheating steam and air without " decomposition." These are, as follows :—Fine clay is ground and prepared in the finest manner, and mixed with an equal weight of coarsely ground fire-brick, adding about 25 per cent. of dried horse dung, also adding vegetable or animal gluten dissolved in a decoction of malt, barley, beer, or solution of biborate of soda or caustic potass or soda, also sugar, molasses, &c. This mixture is pressed in strong bags. A porcelain body is next procured more fusible than the above, and by means of a pipe-making machine, or otherwise, a tube is formed, in which is enclosed an air and water-tight calico cylinder filled with air, and the inventor says :—" I then build up as it were, this porcelain clay tube in a " cylindrical wall of the fire-clay mixture, so that it is of a spiral " form, and place it in a strong iron case which completely sur- " rounds it ; then by suitable means the enclosed porcelain clay tube is subjected to the pressure of water internally, by which the calico tube is burst, and thus " obtain a good union of the two " kinds of clay, and the iron case prevents change of form." The superheater is removed from the iron case, and placed in another case, "when the workman finishes all ready for [illegible] the "ultimate drying, and then places it in the kiln," where[illegible]e the firing must be got up very gradually so as to evaporate [illegible]e the moisture before completing the firing. Where the superheater is burned it is fitted with an iron case and packed with dry plumbago and burnt fire-clay.

Superheaters of this description are mentioned as being u[illegible] useful for ventilating purposes.

[Printed, 1*s*. Drawing.]

A.D. 1862, October 27.—N° 2883.

CHATTWOOD, Joseph.

"My invention has for its object the ventilation of rooms [illegible] and "cellars, the equalizing of temperature, and the prevention of "inconvenient drafts or currents in rooms containing fires. To "accomplish this I make the bars of the grate or fire-holder "hollow or tubular, and perforate the said bars with any conve-"nient number of holes or apertures; or I make the sides of the "grate or fire-holder, or the jambs or sides of the fire-holder, with "chambers or cavities, and place any convenient number of per-"forations or apertures therein for the air to pass through. The "air is supplied to the said bars, chambers, or cavities, from the "cellar or room to be ventilated, by means of apertures, channels "or pipes, as may be required."

[Printed, 8*d*. Drawing.]

A.D. 1862, October 29.—N° 2915.

COOKE, William.—(*Provisional protection only.*)—Improvements in ventilators.

"One portion of my improvements consists in so constructing [illegible] "ventilators formed of wire gauze or other material, perforated or "otherwise, that may be capable of expanding or contracting [illegible] "horizontally or otherwise."

"Another portion of my invention relates to improvements by "which ventilators are constructed of wire gauze, or other per-"forated material, of 2 or more folds or slabs at an angle to each "other, and which may be made stationary or to expand or con-"tract at pleasure."

"Another improvement consists in the application of wire "gauze, or other perforated material to the top and bottom of a

" window or such like opening in such manner that by means of " a cord or other suitable arrangement they may be made to act " and work simultaneously or otherwise."

[Printed, 4*d.* No Drawings.]

A.D. 1862, November 1.—N° 2959.

NEWTON, William Edward.—(*A communication from Peter Clopper Schuyler.*)—" Improved apparatus for drying grain and " other substances."

Within a tall tower are arranged, zig-zag-wise, a series of sieves down which the grain, supplied to the uttermost one by an elevator, gradually falls to the bottom. Each sieve is hung at one end on a pivot, and at the other end is carried by a chain, attached to a main chain which can be wound on pulleys for altering the inclinations. On both sides of the inclined sieves is a vertical shaft, rotated from below by bevel gearing, and giving a motion to the sieves similar to that of the " shoe " of a grist mill. The air in the interior of the shaft may be heated by carrying a sheet iron boiler chimney up its side; or air, after being forced by a fan through a heating apparatus, may be led up through the tower.

A kiln for drying grain may be constructed by arranging the platforms at or nearly at a level, and injecting a highly heated current of air into the bottom of the tower. When the grain has been well dried, the ends of the sieves are lowered, and the contents of each of the upper ones passed to that beneath it. Instead of chains, rods worked by racks and pinions may be used for carrying their lower ends.

[Printed, 10*d.* Drawing.]

A.D. 1862, November 3.—N° 2966.

TRACHSEL, Frederick, and CLAYTON, Thomas. — Improvements in heating and ventilating railway carriages, &c.

" We cause a current of air to pass through a metallic box " heated by ignited gas from a number of gas burners to any " temperature that may be desired, after which the heated air " when used on railways is delivered by pipes opening into the " compartment of the carriage requiring to be warmed and ven" tilated. The delivery of the warm air may be at the bottom of " the carriage under a grating or slit, and so distributed to the

" feet of the passengers. And in order that the air so warmed " may be healthful and beneficial, we pass it after it has been " heated through a pipe or box containing coke, pumice stone, " pieces of cloth, flannel, sponges, or other suitable spongy and " porous matters kept continually moistened by a slow dropping " of water.

[Printed, 1*s*. Drawings.]

A.D. 1862, November 11.—Nº 3039.

BURRIDGE, Henry.—Improvements in apparatus for ventilating and distributing fluids.

" My apparatus consists in the employment of a service pipe " or pipes connected to and communicating with one or more " perforated pipes or tubes, arranged in the form of a framework " or otherwise, and extending under the ceiling the whole length " and breadth of such ceiling and across it. I recommend that " the perforations of the pipes be formed in their upper and " lateral sides. The said service pipe is also connected to and " communicates with a hose attached, as desired, to a supply of " water."

[Printed, 8*d*. Drawing.]

A.D. 1862, November 13.—Nº 3065.

KOPISCH, Carl Gottlieb.—Improvement in ventilating vessels. The vessel is propelled by means of heated air ejected from the stern and this air is drawn by means of pumps, worked by steam power, from the cabins and different parts of the vessel, which are thereby ventilated.

[Printed, 8*d*. Drawing.]

A.D. 1862, November 18.—Nº 3099.

BROWN, Robert.—Improvements in ventilating buildings, carriages, ships, &c. The ventilation is effected by the heat of a gas burner or other light.

" The light is supported by the vitiated air of the room or " other confined space. Supposing that I desire to ventilate an " apartment, a tube from the upper part of the room conducts the " vitiated atmosphere down to the light, which may be placed at " any part of the chamber. The impurities of the atmosphere " are thus consumed on passing through the flame, the pro-

" ducts of combustion being carried off into open air by a con-
" fined tube issuing above the flame and traversing the building
" in any direction to some outer wall. By employing a second
" tube within the mouth of the exit tube at the point where it
" meets the outside air, and allowing this second tube to open into
" the apartment I can supply warm fresh air to the room."

[Printed, 10*d*. Drawing.]

A.D. 1862, December 4.—N° 3254.

LEWAL, GABRIEL. — (*A communication from Jean Baptist Fondet.*)—Improvements in apparatus for warming and ventilating.

" The apparatus consists of a box; in the bottom or lower side
" there is a hole to communicate with the external air, and in the
" top or upper side there is a grating pierced with three or more
" ranges of square holes diagonally, and to each of these holes is
" adapted a vertical tube, all communicating with a cylinder
" placed parallel with the box. The cylinder communicates with
" the apartment either by having the ends open or else by extra
" pipes, so as to make the openings into the apartment wherever
" it is desired, but which openings should be on a higher level
" than the cylinder. The apparatus thus constructed is placed in
" the inside of the chimney over an air hole made to communi-
" cate with the external air by means of a pipe, flue, or any
" other means, so that the hole in the bottom of the box cor-
" responds with the said air hole."

[Printed, 4*d*. No Drawings.]

A.D. 1862, December 8.—N° 3290.

HILLIAR, JOHN.—Improvements in joints or hinges "applicable
" to folding ventilators."

" I accomplish my invention by taking, say, two sheets or
" folds of wire gauze or other suitable material; the edges in-
" tended to be joined or attached to be folded over, or a beading
" or rod turned, soldered, sewn, screwed, or otherwise fixed or
" made or attached to such edges, so as to make each edge of
" greater thickness than the other part of sheet plate or board;
" then taking two sheets and laying them upon each other, the
" folded or beaded edges being to the outsides, by passing the
" beaded or folded edges into an oval or other suitably-shaped
" tube by the end, the sheets, plates, or boards passing through

" the slit or open joint, such sheets are secured together, the " beadings preventing the edges from slipping through the " slit."

[Printed, 8*d.* Drawing.]

A.D. 1862, December 8.—Nº 3291.

HILLIAR, John.—Improvements in ventilators for carriages and " other confined spaces."

The ventilators consist of sheets or webs of wire gauze of different degrees of fineness made to roll on tubes in the manner of spring blinds, and attached at their lower edges to the top of the window or other slide by which the ventilating aperture is closed; at each edge of the gauze web is fixed a beading which slides in a slit or open joint made in a tube attached to the side of the window. Several webs of different fineness may be attached to the same roller; or different rollers carrying webs of different fineness may be used.

[Printed, 10*d.* Drawing.]

1863.

A.D. 1863, January 29.—Nº 262.

BONNEVILLE, Henri Adrien.—(*A communication from Louis Jean Gustave de Coninck.*)—" Improvements in the construction " of granaries." They consist in constructing granaries, and stoves for drying grain, embodying a process by which a current of air is led from the base to the summit.

The different floors are built with joists on which are laid inclined planks, forming crests and hollows with open grooves, partly closed by small pieces of wood. The directions of the crests and hollows are alternately crosswise on each floor, and the number of the openings increases towards the lower floors. Under each floor are vertical openings in the side of the granary, covered with metallic cloth, through which air enters as the grain comes down after having been lifted to the top by means of an endless cup chain. Under the bottom floor is placed an inclined plane formed of metallic cloth serving as a sieve, and at the base of which are sliding doors for removing the grain, either for being again lifted up, or for sacking. Wire lattices may be placed above the topmost stage of the granary, forming sieves on which the grain may first be thrown. In order to ventilate the grain when at rest, planks "may be placed across the granary, and the walls " under their extremities may be pierced, thus giving admission " to the air; the grain in meeting with these planks falls on each " side." To increase this action, a tube may be led up on one side of the whole height of the granary, to be fed by a fan below, connected at each story with a branch pipe pierced with holes and placed on the floor.

A magazine or stove for drying grain is constructed of iron, but on similar principles. Air from a fan is driven in the same way into each of the floors, and it is heated on its passage by means of steam surrounding the air conducting pipe. Two apparatus of this kind may be erected one above the other, and separated by a floor, the openings in which may be shut when the two apparatus are full.

[Printed, 8*d*. Drawing.]

A.D. 1863, January 31.—Nº 291. (* *)

WILSON, EDWARD BROWN.—(*Provisional protection only.*)— " Improvements in supplying air, gases, steam, or fluids to iron " and other furnaces, and to engines and vessels requiring such " supply, and in the apparatus employed therein." Apparatus constructed on the principle of "Giffard's injector," is proposed to be used for supplying air, gases, or steam to furnaces. The jet pipe, which may be of an annular or other form, is enclosed in an air chamber, which is "contracted in front of the nozzle and pro- " vided with a regulating plug," or other suitable apparatus. A branch pipe or syphon is attached to the side of the air chamber, through which the air, gases, or steam may be introduced into the chamber. The apparatus may be used for supplying engines and machines, for different manufacturing purposes, and also for ventilating mines, houses, and vessels.

[Printed, 4*d*. No Drawings.]

A.D. 1863, February 6.—Nº 335.

STEVENS, GEORGE.—(*Provisional protection only.*)—" Appara- " tus for effecting a regular supply of air or aeriform fluids." Within an outer chamber is a vessel fixed to an axis, and formed into spiral chambers somewhat as the thread of a screw, with inlet and outlet passages. The outer chamber is partly filled with water, which also partly fills the chamber of the internal vessel. This outer chamber is also provided with inlet and outlet passages, the latter passing to within the inner vessel. Motion being given to the internal vessel by a pulley and weighted cord, or by wheelwork, "air will flow in by the inlet passages, and be con-" ducted along the internal screw-like chamber" to the outlet passage, and thence by pipes in a stream for supplying air to apartments and other places.

[Printed, 4*d*. No Drawings.]

A.D. 1863, February 26.—N° 535.

EDMONDS, Henry.—" Improvements in the ventilation of " ships and vessels, and apparatus connected therewith." The parts more especially to be ventilated are " the upper spaces of " inhabited decks between the beams, cabins, storerooms, and " magazines and the bilges, and those channels between the inner " and outer planking or plating of the ship separated from each " other laterally by the upright timbers or ribs extending from " above downwards to the bilges."

In steamers, the funnel, its uptake or casing, or the ash-pit of the boiler furnace, is used for inducing a draught. When the fires are not lighted for steaming purposes, a small fire or stove is placed in one of the furnaces or ash-pits.

The up-draught in hollow iron masts is preferably used; or also fans, screws, or bellows.

In sailing ships also, vertical tubes with reversible cowls are employed.

These apparatus, singly or conjointly, are set in communication with channels running longitudinally with the ship, and communicating with cross channels opening into the parts to be ventilated.

A steamer is shewn, with longitudinal air channels along the ship's side, and another flush with the deck. The first communicates with the bridge, up between the inner and outer planking of the ship, and another current is led from the mess and cabin deck downwards between the inner and outer planking, and into the same longitudinal channel. These currents, and one from the longitudinal channel on deck, unite into a pipe communicating with the funnel. The longitudinal shaft may also be placed beneath the mess deck, or still lower, and the communicating cross shaft "downwards till near the floor of the boilers, "between two of which it should pass and divide opposite the ash-"pits of their furnaces into two small branches," entering beneath the fires by a valved opening.

In sailing vessels, the longitudinal shaft only is shewn carried along over "the list piece" covering this in, and communicating with the openings leading to the space between the inner and outer planking of the ship. The longitudinal shaft opens into vertical tubes rising above the deck and fitted with movable cowls, which, "when a dry wind is blowing, may be faced to it."

[Printed, 10*d*. Drawing.]

A.D. 1863, March 5.—Nº 624.

MILLER, John.—"Improvements in horticultural buildings "and other glazed structures, part of which improvements is also "applicable to ventilating other buildings." They principally relate to arranging the parts of such structures so that they may be readily put up and taken to pieces again. The heads and sills of the side and end frames are connected together by angle iron, and the uprights are tenoned therein. The side or end frames may also be formed in separate sections by dividing them through some of the vertical portions, connecting such divided parts by screws. Cross stays are applied from the mullions of one side to those of the other. The side or end sashes are formed in two sets to slide one over, or to pass one in front of the other on metal ridges perforated to admit of any water freely passing away. The overlapping portions, when the sashes are closed, lie behind the uprights. The roof is formed in similar sections by division of the main beams, in this case attached to the glazed frames. For a span roof two ridge pieces are employed, with a space between them for the passage of air, and connected together at intervals. Over these connections and between the ridge pieces is a stationary plate with perforations at intervals, and over this is another plate, also perforated, and capable of being slided, so that either its perforated or the plain portions may come over the perforations of the stationary plate. The sliding plate can be removed by a lever. There may be two or more such perforated plates. Somewhat above the ridge pieces between which they are placed, and supported at intervals so as to admit of ventilation, is erected a narrow span roof. Similar double ridges and parts are also applicable to simple inclined roofs.

[Printed, 10*d*. Drawing.]

A.D. 1863, March 19.—Nº 735.

LEVER, Ellis.—" An improved composition for the coating " and preservation of canvass and other materials to make them " waterproof and non-inflammable." It consists of quicklime, glue, whiting, sulphate of ammonia, and alum, dissolved in hot water. The material so coated " will be applicable to the venti- " lation of mines where resistance to damp and fire is requisite " to tarpauling," and similar purposes.

[Printed, 4*d*. No Drawings.]

A.D. 1863, March 21.—Nº 753.

EVANS, Isaac Mark, and GRIFFITHS, William Thomas. —(*Provisional protection only.*)—" Improved means for ventilating " mines." Near the upper part of the upcast shaft is erected a tower, open at the top, and from its lower part there is led a hot air tube communicating with a fire-clay channel at the side " of " the furnace in the form of a channel " " of the brickwork of the " furnace of a steam boiler." This boiler can either be outside or inside the tower. The heated air is to supply the interior of the tower, and a steam pipe from the boiler opens into a steam box, with a ring of jet pipes, placed at the upper part of the tower. Above this steam box is an inverted cone; that portion of the tower surrounding it being widened out, so that the cone may adjust the draught on its being raised or lowered. The bottom of the tower is drained by making it " inclining to the centre." With mines having one shaft only, these arrangements can be connected with the upcast side of the brattice.

[Printed, 4*d*. No Drawings.]

A.D. 1863, April 27.—Nº 1052.

JEFFREYS, Julius.—(*Provisional protection only.*)—" Improve- " ments in constructing surface condensers and apparatus for " heating and cooling fluids." In constructing surface condensers of steam engines thin plates of copper are used stamped with parallel flutes, and separated the one from the other by flat ridges. These plates are placed together in pairs, face to face, so that the ridges of one come over those of the other, but separated by a soldering metal placed between the two. The pairs of fluted plates thus arranged are piled up one pile over the other, but with "fluted plates of iron between the " pairs, so as to make a solid pile, which is then placed " under pressure to bring the ridges of the two plates of each " pair close up the one to the other. In this state the pile " is heated till the soldering" metal melts, when the pile still under pressure, or placed under increased pressure in a press, is allowed to cool. The soldering metal is employed as a thin sheet, which is placed between the fluted plates. When the plates are clamped together they are placed upright in a stove, " so that when the soldering metal melts, the portions between " the ridges fall down on to the ridges beneath, so that on the " upper part of each of the solder joints to be made a small " puddle of melted solder is formed." "These sets of tubes " may be connected together by turning up the edges of the " plates of which they are formed, and enclosing them in a split " tube, into which cement or solder is then cast or soldered, or " brazed joints may be employed. The whole arrangement is " enclosed in a case, and the steam to be condensed is caused " to pass into the tubular spaces whilst the cooling" "water is " made to circulate in the spaces between the pairs of plates."

"Apparatus constructed in a similar manner is applicable also " for heating and cooling fluids, whether liquid or aeriform, one " fluid being caused to pass through the tubular spaces, whilst " another is caused to circulate in the spaces exterior thereof." Amongst these applications is "the ventilation of rooms or build-" ings which are required to be kept at a high temperature. For " this purpose the heated air from the room or building is caused " to pass through the apparatus in one direction, whilst the in-" coming air to supply its place passes through the apparatus in " the contrary direction."

When the tubes are employed for ventilating purposes there is placed between every set a thin board "of wood shorter than " the tubes, so as to form passages for horizontal currents of " air outside the tubes, which currents then travel vertically over " the metallic surfaces, and again get a horizontal vent between " the tubes, so as to have a distinct entrance and exit from those " of the currents within the tubes, and to form with them a " counter current in the direction lengthways of the tubes."

"Another application of the apparatus is for the heating of "water or other liquid to generate steam." The liquid may "surround the tubular passages between each pair of plates. It "is not in all cases necessary to solder" "together the two plates "forming a pair along the ridges separating the parallel flutes, "the two plates forming a pair may simply be placed the one on "the other with the ridges in contact."

[Printed, 4*d*. No Drawings.]

A.D. 1863, May 19.—N° 1256.

PARKER, Abraham.—(*A communication from James Partridge.*) —"An improved apparatus for saving from destruction by fire "persons and property in houses, buildings, and ships, and also "for ventilating ships."

Houses and buildings are laid with tubing "carried up to the "roof and along the tye beam to the king post from one end of "the roof to the other." Thence branches "proceed from the "king post up the streets," and are "fixed to the purlins." They are to be perforated with rows of holes in a zig-zag direction going from end to end of the roof; and each end is to have perforated bends, and is to be brought across and connected with the pipes opposite, which are also to be perforated.

In ships or vessels, pumps will be required for the main decks to draw water from the sea and force the same through tubing into small pipes perforated with "rows of holes and fixed from stem "to stern of the ship in different lengths, one line being under "the centre of each deck, but to be bent round the masts and "hatchways." The same kind of perforated pipe is also to be fixed along the underneath part of the deck, "each three lengths "in a row to be connected with cross pieces of perforated pipe "underneath the deck from side to side; the cross pieces to be "connected with the ends of each pipe at the side with bends of "perforated pipe."

The feed pipes which descend to the lower deck or hold should be separated from those described above. The poop decks are to fitted with one length of plain pipe passing through each row of cabins with a rose to each cabin. "The saloons to be fitted "with one length of perforated pipe passing up the centre of "the underneath part of the ceiling or deck above. For small "vessels the centre perforated pipe may be dispensed with. For "vessels of deep draught some of the water may be sprung from "the sea by means of cocks or injections."

"In order to use this apparatus for ventilating ships a branch "of tubing must be connected with each feed pipe on each side "of the vessel below the main deck, passing up through the same "near the bulwarks," "and connected with a flange screwed to "the upper part of the main deck, and having screw caps." Into each of these flanges another pipe will be screwed, having a stop cock to shut off the water in case of fire.

[Printed, 4*d*. No Drawings.]

A.D. 1863, May 23.—N° 1296. (* *)

ROSSER, Samuel Egan, and JENNINGS, Josiah George.—"Improvements in chimneys, fire-places, stoves, and flues "for warming and ventilating apartments." "The throat" connecting the grate of a fire-place or a stove with the flue or chimney is formed with an opening "considerably less in area "than the body of the flue or chimney, from which opening "such throat" "progressively increases in area until its area "becomes equal to that of the chimney or flue." The top of the chimney is provided with a deflector. Air chambers are made at some part of the chimney or of the fire, to which fresh air is conveyed from "a foundation box" with orifices corresponding "to the air passages in the stove." "The air so introduced "having become heated," "is discharged into the room through "warm air openings." "At the back" of the grate "vertical "slits or vents" are formed, which open into the "expanding "throat," and air chambers may be made "in the bodies of the "divisions," "from which holes communicate with the fire."

[Printed, 2*s*. Drawings.]

A.D. 1863, May 25.—N° 1315.

HILLIAR, John.—"Improvements in the construction of the "frames, sashes, shutters, blinds, and ventilators for windows or "other openings, part of which improvements are also applicable "to other constructive purposes." A number of different window and carriage ventilators, besides modes of working them, are shewn. The drawings should be consulted.

The sashes, shutters, blinds, and ventilators for a window "or other opening" are combined into one apparatus, so as to be "adjustable by the same mechanism. The jambs of a window "usually occupied by a sash frame are made with a number "of grooves running vertically side by side;" and the corresponding edges of the sashes, blind, shutters, or ventilators, are tongued to work in these grooves. Or these jambs may be formed with the open joint tubing as described in Specification No. 3290, A.D. 1862. "By employing a system of cords and pulleys "worked by toothed wheels and a winch handle at one side of "the opening," either of the sashes can be operated upon, "lowering one or both into a casing behind the 'dado' or "below the floor, and leaving a clear opening, if desired, or raising "or lowering the shutters, which, when out of use, also drop "into the casing, or drawing over the whole or part of the opening a wire gauze blind acting as a ventilator," such as described in Specification No. 3291, A.D. 1862. This ventilator "may, "when not in use, be wound up into a tube in the soffit of the "window by a spring roller." Above the winch by which the arrangement is worked is "an index plate directing the operator," which particular wheel to throw into gear. This arrangement is "also adapted for carriage windows."

Or, instead of the system of tubing and jambs, wooden frames may be employed, "to which are attached open tube slide "fittings," with either the open tube or the slide attached to the frame.

Ventilators for insertion in windows or other openings are formed of a strip of wire gauze "mounted in a thin metal "grooved frame, to the upper back edge of which is hung by "means of the open tube hinge" specified above, "a sheet of "glass intended to fall close at the back of the gauze, upon being "allowed to so by releasing a cord upon a pulley or a quadrant catch, which latter can then be turned over the front of "the gauze and form a lock for securing all together closely. "The gauze can be removed from the mount at any time when "either more light or more air way be desirable." A single and a double current ventilator are shewn upon this principle. The leaves carrying the glass can fall either from or to the centre, and the leaves forming the ventilator are similarly hung from the inside. The leaves are opened by curved springs, and closed by a cord and pulley.

In a modification "a double level current is obtained by making "the leaves to open horizontally instead of vertically.

A single current ventilator consists of a "plat" of thin metal *hinged to* a frame in which the gauze is mounted, and moveable upon a quadrant stay. Or the glass can be fixed in a frame, opened and closed by a notched-jointed stay bar. In yet another form both the glass and gauze are moveable, the gauze being hinged to the inside, secured by a catch, and with the glass hung to the outside.

The wire gauze ventilator may also be made to work as a rolling blind, and the glass to open by means of springs. The blind is drawn down, and the glass closed by a cord and pulley. Other slight modifications of these plans of opening and closing such blinds are shewn.

[Printed, 10*d*. Drawing.]

A.D. 1863, July 1.—N° 1636.

BOYLE, Thomas.—A "system of ventilation applicable to every "description of dwelling place and building."

In the Provisional Specification it is stated to consist of openings made in the glass both across the top and bottom of a window, in which is fixed wire gauze. The openings may be of any size, number, or shape; or one oblong opening between the glass and the top and bottom frame of any window may be used. Coverings for them may be made of slips of glass, cut to the width of the panes, and so fixed on pivots or hinges that the passages may be closed or opened. Or the covering may be made of such a size and shape to cover each opening separately. Additional openings may be made in the sides, as well as the top and bottom, of windows.

In the complete Specification, "the system" is described as applicable to "doors, partitions, walls, ceilings, or roofs," as well as windows; and finely perforated talc or mica, or finely woven copper gauze, is used as the air filtering medium. Discs of these materials are set in rings, themselves fitted into apertures cut in the glasses of windows, the woodwork of doors or partitions, in walls, ceilings, or roofs.

In the case of windows, thin doors, and partitions, a disc either of copper wire gauze or of perforated talc is used, fixed round the edge to a ring of brass. This ring is formed of a perpendicular neck all round the inside, of the same depth as the thickness of the glass, and a flange is thrown outwards therefrom at a right angle, forming a ring to rest on the surface of the glass. This neck is inserted into a hole in the glass, and a plain ring is fitted into the neck, the connections being made with putty.

To such ventilators glass covers are also fitted, being made to open and shut from the inside by means of "a circular sliding "movement round an excentric centre situated at the bottom of "the ventilator." On the flanged part of the ring of the ventilator are fixed, in a vertical line, two pins, one to serve as the centre, and the other as the catch. The glass cover is fitted in a metal ring, made at one part to correspond with the centre pin, and at the other, by means of a slot, with the catch pin. On moving the cover round, a slight projection on the catch pin takes the slot on the flange of the ring. A plate glass cover can be made without a frame. With ventilators placed at a high level, the covers are adjusted by lines and guide pulleys; when within reach, they can be closed by hand by means of a small button.

Ventilators to be set in walls, thick doors, or partitions, are made with a main iron tube, into which is inserted a tube of zinc, "open, and having a screw thread at one end and a fixed per"forated cap at the other. This cap is made wide enough to "project beyond the diameter of the tube all round." This second tube is to be inserted through the tube in masonry, and "secured there by means of a detached cap, similar to that on "the other end, screwed on to the open end of it, and drawing "the two caps" together. The detached cap also contains a screen of finely perforated material. The air once admitted can "be deflected in various directions, or conducted by extension "tubes," or through additional "screens of draughtless media." The ventilating aperture thus formed may be also fitted without "any "finely perforated air medium."

One or more distinct ventilators of this kind may be so combined at different levels of the same apartments, as to allow both the admission and escape of air. They may be fixed "in the "windows only, in the walls only, or in the doors only of any "apartment, or in any of these places combined."

[Printed, 8*d*. Drawing.]

A.D. 1863, July 4.—N° 1669.

NORMAN, Alfred.—(*Provisional protection only.*)—"An im"proved apparatus for fanning or for agitating air," for keeping apartments cool. It consists of an oval shaped fan, to which is communicated a motion of revolution partial or entire, in each direction alternately, by mechanical means. This is done by *clockwork* or wheelwork. The fan is mounted on an axis, carrying a pallet stud, "driven by an escapement or toothed wheel "worked by a train of wheels, actuated by a main spring. The "axis also carries a balance wheel and a spring, one end of which "is attached to a fixed point. The axis is worked in one direction "by the escapement or toothed wheel, (which moves the pallet or "stud, and expands" the spring), and in the contrary direction by the recoil of the spring. The fan is thus "driven partly or "wholly round in each direction alternately," and the air kept in constant motion.

[Printed, 4*d*. No Drawings.]

A.D. 1863, July 13.—N° 1740.

MORTIMER, James.—"Improvements in the construction and "arrangement of dwelling houses, in combination with the "means employed for ventilating the same." They are especially applicable to dwelling houses constructed with central walls dividing one tenement or a set from another. Such houses are built in "blocks," each dwelling being accessible by an entrance of its own. Each block is constructed with longitudinal and transverse walls dividing the ground floor and upper story into four sections.

A ventilating shaft is so arranged in combination with houses in "blocks," that through ventilation may be obtained to each of the dwellings. Having raised the outer, the longitudinal, and transverse walls to form the ground-floor into four distinct dwellings, a cast iron foundation plate is placed upon each of the four angles formed where the longitudinal and transverse walls cross each other. This plate may either be in one piece to cover the four angles, or in separate parts to cover each angle separately. Openings are formed in it over each angle, to which a glazed skylight is hinged, to admit light and to circulate foul air. Upon the outer edge of each plate, over each angle formed by the walls below, is laid brickwork, forming a square shaft passing up through the roof of the structure, and open to the atmosphere. Near the angles of the central walls on the ground floor are placed the waterclosets for each dwelling, so that by opening the skylight in the plate, which forms part of the ceiling of each closet, through ventilation is obtained from the outer atmosphere through the central air shaft. The waterclosets of the separate dwellings on the upper story are placed near to the central air-shaft, openings being formed in the side walls into the air-shaft with glazed sashes, which can be opened or closed at pleasure, so as to permit the circulation of air to each closet. Gutters on the roof convey the rainfall into a pipe passing down the central air-shaft, the water from the roof being conducted by this pipe into a trap common to all the waterclosets. Shoots are formed in the side walls of each dwelling through which refuse may be discharged into an ash-pit outside the buildings.

[Printed, 2*s.* 2*d.* Drawings.]

A.D. 1863, July 21.—Nº 1825.

BAINBRIDGE, Edward Thomas.—"Improvements in venti-"lators." The term "ventilator" is here used for a form of screw fan with peculiarly shaped blades. The shaft is erected on bearings or on friction rollers, and driven by a strap passing round or keyed on a pulley. The blades are made with their inner edges forming tangents to the axis. At the back the blades are curved and they may also "be curved forwards from their junction with "the axis. Four or more such blades may be employed."

[Printed, 1*s.* 2*d.* Drawings.]

A.D. 1863, July 28.—Nº 1873.

TAYLOR, Douglas.—(*Provisional protection only.*)—"Improve-"ments in ventilating hay, corn, and other ricks, and in apparatus "connected therewith." Under one modification the ventilator consists of six open frames formed of two longitudinal spars of timber. These spars extend nearly to the top of the rick when placed in an erect position, and they are arranged so as to taper towards the upper part. The side pieces are held by transverse bolts fitted to the spars at intervals. Outside each of these frames a number of cross pieces are arranged parallel to each other and fastened to the side frames. They are then joined together at the bottom and raised upright and supported in that position by the tops resting against each other. The combined frames form a conical air channel intended to occupy the centre of the rick. The sheaves are arranged with their inner ends resting on the cross bars of the frames sufficiently to admit of the air which passes into the central channel circulating between the several layers of sheaves. Air is conveyed into the central channel by means of a wooden pipe; and at the upper part of the compound frame is fitted a vertical pipe of zinc, which extends out through the top of the rick and serves to carry of the heated air from the interior. The outer extremity of this pipe is furnished with an overhanging cover which to prevent the admission of rain. Outside the rick four, six, or other number of struts are fixed in the ground. These pieces extend up to within two feet of the shoulder of the rick and each serves to sustain a spar, the inner end of which rests upon one of the cross bars of the central frame.

[Printed, 4*d*. No Drawings.]

A.D. 1863, August 4.—N° 1921.

STEVENS, George.—" Improvements in means or apparatus " for effecting a regular supply of air or aeriform fluids for various " purposes." It is stated to be applicable " for the supply of " atmospheric air to the photogenic gas light or for supplying air " to or withdrawing air from apartments and other places."

Within a chamber is fitted a vessel turning with a shaft carried on bearings. This internal vessel is formed into spiral chambers by means of helical partitions connected with the axis. The outer chamber is partly filled with water, as also the compartments of the internal vessel, so that air, flowing in at the top of the outside casing a central opening at the outside, is caused to traverse it from end to end. It passes out at a pipe communicating with a chamber containing water, up which it rises and is thence conducted through another pipe for use. The cover of this chamber is formed by a float which may be weighted in order to regulate the flow of air. The central shaft is turned by means of a descending weight and cord giving motion to a train of gearing; or it may be otherwise driven.

[Printed, 10*d*. Drawing.]

A.D. 1863, August 18.—N° 2049. (* *)

DOBB, Thomas.—" Improvements in chimney tops," which are also applicable to coverings for ventilating shafts or flues from mines and other places. The top is made in two conical parts " one above the other, an opening being left between the two." " The top of the upper cone has also a passage through it, and " across this face a horizontal face wheel is placed which is " capable of revolving " on a vertical axis. " Outside the two

" cones is placed a conical hood" "open both at the top and " bottom," so as to allow some of the wind to rise up it, and " either escape at the open top" or " pass through the fan wheel," " and to increase the current" "up the flue."

[Printed, 8*d*. Drawing.]

A.D. 1863, August 19.—N° 2058.

SONNHAMMER, CHARLES.—"An improved fan." On all the folds of a ladies' fan, and at that part of the fold which forms edge and is presented outward when the fan is closed, and on the side frames, are placed loops of wire or of elastic material. Into each of these loops is introduced the stalk of a natural or of an artificial flower, so that the flowers together with their leaves may when the fan is open form a border along the top, and when the fan is closed a bouquet. In order that the fan when closed and forming bouquet may hang downward from the hand of the bearer without the flowers falling out, a hook may extend from the ring nearest the top of the fan and be concealed within the leaves of the flower, or one of the loops may be elastic. The loops which are to receive the stems of the flowers should not cover each other when the fan is closed but should in each fold be placed on a different line. " When the fan is closed a ring may be passed up from the " handle to keep it closed, or a small elastic band or other con- " trivance may be used." When the fan is out of use the flowers can be taken out to form a bouquet.

[Printed, 4*d*. No Drawings.]

A.D. 1863, August 21.—N° 2074.

HILL, JAMES FRANCE. — (*Provisional protection only.*)—" An " improved ventilating gas lamp or gasalier." A gas light is supported by a pendant tube enclosed within a shade composed of transparent or semi-opaque and partly semi-opaque glass. The surfaces of the material of this shade " possess at the top and sides " a greater power of reflection than of radiation, and at the bottom " a greater power of radiation." To each of such lights is supplied a separate ventilating tube fixed to the top portion of the shade, and communicating with any air shaft so that it conducts away the products of combustion. The body of the apartment is further *ventilated* by openings in the wall or ceiling surrounding these *tubes*.

A peculiar construction of lamp to be hung from the ceiling may be used either singly or in groups. In the ceiling is fixed a perforated plate to the upper part of which is attached a tube to form an air flue, and this terminates in any chimney or other outlet to the open air. From the centre of this plate are suspended two tubes of different diameters, one within the other, the inner one being the gas tube terminating in the burner, the outer one the ventilating tube terminating at a suitable distance above it to receive the products of combustion. Over the burner and supported by the tube is fixed a glass cover in such a manner as to allow of no opening at the top excepting one in the ventilating tube. Underneath the open bottom is fixed a dish of glass capable of being raised sufficiently near to the top glass as to prevent the flame within from being directly seen, and lowered to such an extent as to admit air to the burner, and to answer as a door for obtaining access to the interior of the lamp.

[Printed, 4*d*. No Drawings.]

A.D. 1863, September 11.—Nº 2241.

MEYER, Louis.—(*Provisional protection only.*) — "Improved "means of, and apparatus for, employing vapours, gases, and "the heat derived from combustible matters." The apparatus may "be used to expel foul air from, and introduce fresh air "into factories, airing shafts," and diving bells; but it is difficult to see how this is to be done, more particularly with regard to the last application. It is also claimed that the "invention pro-"vides all focuses or fire-places in which are disengaged vapours, "gases, heat, or smoke, with the means of utilizing them "totally."

"To make use of the totality of the vapour or steam which "may be produced in any machine," there is joined to such machine "a supplementary apparatus of a construction analogous "to that of a cylinder," to "receive the escapements of steam "from the ordinary cylinder" in order to be there "compressed "and conducted into the supplementary apparatus, and by this "same movement brought back into the boiler."

The Drawing shews an ordinary rotating fan for exhausting the fire gases from one or more fire-places, and driving them into "apparatus suitable either to concentrate, to purify, or to bring "them back to their primitive focus, or fire-place" or fire-places.

A drum is shewn "on which is rolled a cable" leading from the boat to the diving machine. The cable must contain two tubes, one for the suction of air from, and the other for forcing air into, the diving machine, as also an electric wire.

The "invention" may be applied not only when using a fan or ventilator, but also using suction and force pumps.

[Printed, 6*d*. Drawing.]

A.D. 1863, September 14.—N° 2253.

RIVIERE, Henry.—"Improvements in the construction and "application of apparatus and implements used for the purposes "of heating, cooling, and evaporating." They consist in corrugating plates of metal, or also of clay, with deep furrows, and using such plates in the construction of stoves for ventilating, and for which "an index may be employed to show the quantity "of air passing through them."

The drawings shew what is apparently a gas stove, with its sides made of the corrugated plate, and having a chimney in the form of an ornamental column. The corrugated plates form a triangle in plan, and the fire gases from flames at the base first pass up a tube somewhat higher than the bottom opening of another tube leading from the bottom of the chimney. "Or the heat may be made "to pass spirally over the surface." "By "making these stoves with an outer casing a" "ventilating stove "is produced, a small hole being cut in the floor over which the "stove is placed," and a communication must be established connecting the space between the joists with the external air."

One form of the index consists of a tube, with its end covered by a sort of flap valve, the oscillations of which are carried by levers to a pointer vibrating over a plate. Or a valve, working up and down vertically in a sort of funnel, is directly attached to the pointer of a vertical index."

The plate with concentric corrugations, termed a "helix" by the inventor, may also "be used for cooling and ventilating by "covering perforated metal with wet cloth, or the cloth alone "may be stretched in the form of the helix with strings between "two boards."

[Printed, 10*d*. Drawing.]

A.D. 1863, September 29.—N° 2386.

MULHOLLAND, Frederick George.—"Improvements in "the mode of manufacturing submarine telegraph cables, in

" apparatus connected therewith, and in the method or principle " of laying same, and in the preparation of the general com- " pounds described for electric insulations and other purposes." They principally relate to the construction and laying of telegraphic cables; and, as a means for preserving " the cable pre- " vious to submergence," there is briefly specified the " use of fans " (worked by steam or otherwise) either for exhausting impure " air from, or forcing pure into the hold and between decks to " prevent any variable and injurious increase of temperature " below, and consequent deterioration of the cable while coiled " from sweating, mildewing, or other common prejudicial effects " of close stowage."

[Printed, 6*d*. No Drawings.]

A.D. 1863, October 3.—N° 2425.

WILSON, **Edward Brown**.—" Improvements in the manu- " facture of iron and other metals, and in the apparatus em- " ployed therein, parts of which are applicable for other purposes " where high temperatures are employed, and also for ventila- " tion." They principally relate to smelting furnaces, and a form of steel converter, but the inventor also proposes to apply a plan for creating a draught in a chimney " to the ventilation of " mines and large buildings."

Steam jets are arranged in a " chimney at successive heights."

Or the top part of the chimney may be filled with metal pipes, placed vertically, and at the bottom of each a small jet is thrown upwards. Such groups of pipes and jets may also be placed at different levels; and the pipes may also be supplied with other jets at higher levels.

[Printed, 10*d*. Drawing.]

A.D. 1863, October 9.—N° 2481. (* *)

FELLOWS, **Noah**.—(*Provisional protection only*.)—" An im- " proved method of extinguishing fires in chimneys and flues, " regulating and promoting draught therein, calculated also to " act as a ventilator." " A spiral diaphragm of metal " is so made " that when lifted by the centre an opening is formed for " the passage of air or smoke." The opening is " to be regulated " by a spring " in a box " from which is attached a chain " " to " the bottom or fire-grate." When fixed " at the bottom of any

" chimney, cowl, or cap " " or in the brickwork of any chimney " or flue," it is to act " as a damper in case of fire, or a stimulus " to draught, and a ventilator." Fixed to " any ordinary cowl " with a revolving head " " it revolves with it," and the " strong " upward current " it produces " can be regulated by the lower " spiral diaphragm."

[Printed, 4*d*. No Drawings.]

A.D. 1863, October 15.—Nº 2526.

CLAYTON, HENRY.—" Improvements in buildings used for " drying bricks, tiles, and other articles." Buildings in which bricks and tiles are piled into hacks to be dried are arranged with heating and ventilating apparatus, by which heated air is supplied to the articles and the moist vapours caused to pass downwards and along passages running lengthwise of the hacks, and then out of the building. A furnace is erected at one end of the drying room. It communicates with a flue running round the building, and leading the smoke on its way to the chimney through tubes placed in the furnace. In front of the furnace is a fan, exhausting air through tubes in the furnace in order to force it through long perforated pipes into the drying room. Air flues, forming hollow hakes, upon which the bricks are placed, run the whole length of the room, and communicate at the furnace end, with two main air flues which open into a main conduit to which is attached an air-pump or exhauster for discharging the moist air into a vertical shaft. The tiles are piled on the hacks or air flues in the usual way; bricks to be dried being placed rather wider apart than is customary in out-door drying. To regulate the moisture of the air, a valve, with a pipe attached to it, is made to connect the exhauster with the air-blast of the fan, by which more or less moist air may be returned to the drying room if found necessary. To adjust the heat, a valve is placed in the smoke-flue leading from the furnace round the room. In fine weather air may be admitted through inlets at the upper part.

[Printed, 1*s*. 2*d*. Drawings.]

A.D. 1863, October 15.—Nº 2530. (* *)

FLEXEN, STEPHEN.—" An improved apparatus for ventilating " railway and other carriages, houses, buildings, steam and sailing " vessels of all kinds, moveable or otherwise." The invention consists of "an apparatus in which a roller and pulleys or "wheels and lines, cords, gut, tapes, straps, or chains are combined as follows with a folding louvre ventilator placed at "the upper part of a sash frame, window frame, or other similar "frame, that is to say, I fix a flexible line, cord, gut, tape, strap, "or chain (by one end) to each side of the bottom of the ventilator, and I pass the other end of each such line, cord, gut, tape, "strap, or chain over a pulley or wheel, or pulleys or wheels, "and I fix it to a roller towards the centre of the roller, such "roller being placed immediately above the ventilator, so that "when the roller is turned round for the purpose of raising the "ventilator the said lines, cords, guts, tapes, straps, or chains "attached to the bottom of the ventilator shall wind round the "roller worm-like or spirally without entangling. I work or turn "the roller by a cord, gut, tape, strap, line, or chain coiled round "one end of the roller."

The invention may be employed for excluding dust, and for stopping or regulating the passage of drafts of air, vapours, or gases into and out of houses, vessels, or carriages.

[Printed, 8*d*. Drawing.]

A.D. 1863, November 2.—Nº 2712.

WINTOUR, THOMAS FITZGERALD.—(*Provisional protection only.*)—"Improvements in ventilators and fire-guards." They relate to wire gauze or perforated ventilators attached to the upper sash of a window, so that as the window is opened the ventilator is drawn down over the open space so as to prevent draught.

The ventilator is formed of strips hinged together longitudinally, so as to fold up and open out like a folding screen. The frame of each section is made of zinc, surrounding wire gauze or perforated metal, and the hinge is made of a convolute form by rolling the edges of the two frames one within the other. Each section is made of two or more parts capable of sliding over each other, so that it can be made to fit immediately to any size of window.

A "conical shaft ventilator" is constructed of perforated zinc or wire gauze rolled into a conical form, with a shaft in the centre to cause an upward draught. It is to be fixed in the ceiling of any building; its outer edge being inserted in a hoop of wood.

A "crinoline safety fire-guard," constructed of wire gauze, is to envelope the fire-place. It is fastened at the side of the stove by hooks. A large sliding door is formed in the centre of the guard to admit of access to the fire.

[Printed, 4*d*. No Drawings.]

A.D. 1863, November 4.—Nº 2726. (* *)

HUGHES, Edward.—"Improvements in fans" "for exhausting or forcing atmospheric air or other gases; for the ventilation of mines, collieries, buildings," &c.; and "for the blowing of blast furnaces, cupolas, hearths, forges, and similar purposes." The invention consists in "a screw fan composed of sections of an archimedian screw arranged on a horizontal shaft," revolving in water "nearly to the depth of the semi-diameter of the screw," "and contained in a casing wider than its diameter."

[Printed, 10*d*. Drawing.]

A.D. 1863, November 9.—Nº 2786.

PHILIPSON, Ralph Henry, and DEES, John.—(*Provisional protection only.*)—"An improved machine adapted for performing various mining operations, such as working or cutting coal or other analogous substances in mines, forcing water from mines and air thereunto." It consists of a framing carrying a large screw, which works through a nut moving in grooves. To this screwed block a pick is affixed and worked by bevil wheels, which cause the screw to revolve. The direction of motion is reversed by a clutch worked from the main shaft of the machine by excentrics. The "bevil wheels receive motion from a pinion wheel driven by another wheel and pinion attached to the same shaft;" this last "pinion is driven by a wheel running on another shaft, to which another pinion is attached; this pinion receives its motion from a bevil wheel on the main shaft of the machine. The machine may be mounted on four wheels to run on a tramway;" two of these "wheels are double-flanged, and are moved forward by a worm and worm wheel worked by a ratchet connected with an excentric fixed on the main shaft of the machine. A lever is employed for throwing the wheelwork out of gear for moving the machine backward when necessary. One or two fly wheels may be fixed on the main shaft" "to assist the working of the machine."

[*Printed*, 4*d*. No Drawings.]

A.D. 1863, November 20.—N° 2924. (* *)

NEWTON, William Edward.—(*A communication from Milton Nobles.*)—" Improvements in the construction of fan blowers for " ventilating and other purposes." The invention consists " in " gathering and expelling from an apartment of any kind the foul " air or gases, and at the same time and by the same apparatus " drawing in fresh air from without and forcing it into the apart- " ment to supply the place of that expelled, thus doing two " things at one and the same time, or by one and the same ope- " ration, both of which are essential to a speedy change of air in " the apartment to be ventilated, as will be explained."

The eyes of the fan cases are tightly closed up, and from them pipes or air ducts " lead to the points or places where the foul air " is to be taken in and carried to, and where the fresh or pure " air is to come from respectively." At the top of the fan case there are two exit ducts or air trunks, through one of which the impure air is carried out of the apartment, and through the other one of which the pure air is forced into the apartment from without the building, structure, or place to be ventilated. The interior of the fan case is divided by a partition corresponding to the division board of the air trunks. A fan shaft extends through the fan case from side to side, and may have on its projecting ends pullies, by which it may be driven. Upon this shaft are arranged radial arms, carrying wings or blades of any suitable number or shape, for creating both a suction and exhaust current through the apparatus from the apartment to the external air, and from the external air to the apartment, or counter currents of foul and of pure air. The fan case may be divided horizontally if desired, and be hinged with a suitable tightening and holding catch or latch for the purposes of access to the interior.

" The fresh air drawn in and distributed through the apartment " may be cooled or moistened, or both, artificially, by drawing " or expelling it through an ice-box, water chamber, or other- " wise. For expelling smoke or gases from gun decks or towers, " or for ventilating the holds of vessels, this apparatus is " peculiarly applicable, and it may be also applied to buildings, " vaults, mines, and other places. The fan is both a suction " and forcing fan taking from a specific place, and forcing to " another specific place the air within its influence, and it may " be made to rotate in either direction without changing this

" characteristic of its operation, but in changing its motion the " terminations of its inlets and exits should be arranged " accordingly."

[Printed, 8*d*. Drawing.]

A.D. 1863, December 2.—Nº 3033.

CUTLER, Joseph.—(*Provisional protection only.*)—" Improve- " ments in apparatus for lighting and ventilating." Apparatus for lighting a room is preferably arranged for burning gas, but oil or spirit lamps may be employed. It is placed near the ceiling, as with " sun lights." " The products of combustion are carried " off by a pipe above the ceiling," having at its entrance end a funnel mouth. This pipe may be made double, the products of combustion being led away through the central pipe. Beneath the funnel mouth is a convex reflector, either of metal or of silvered glass. " The outer diameter of this reflector is made of " less diameter than the entrance to the funnel, and is concentric " with it, so that an annular space is left between the interior of " the funnel and the exterior of the reflector." " Through this " space the heated gases from the burners rise up into the pipe." Below the reflector and ranged around it are the burners. With gas, a ring burner, having a number of small separate gets, is used by preference; or the holes of the burner may be so close that the flames shall all unite together. Below the reflector and the burner is placed a globe of glass, with its sides rising up around the burner. A space is left between the top of this basin and the funnel entrance to the exit pipe, so as to leave a space for the vitiated air in the room to enter. The pipe supplying the burners passes down through the centre of the pipe that conveys away the heated gases. This pipe passes down through the centre of the reflector and of the glass basin below, and beneath the glass basin. " The lower end of the pipe is provided with a knob, by turning " which, the tap that admits gas to the burners may be opened " or shut."

When the apparatus is to be used as an outdoor light, then the top of the exterior glass basin is brought up to the edge of a cover of metal, or of talc. " To the centre of this cover is con- " nected a pipe, by which the products of combustion are carried " away. For the reflector there is employed a globular mirror, " and the ring of lights may either be placed on a level with the

" centre of the globe " or below the centre. The pipe that supplies gas to the burners is similar to that above described.

[Printed, 4*d*. No Drawings.]

A.D. 1863, December 8.—N° 3094.

WASON, Peter Rigby.—" Improvements in apparatus used " for heating and ventilating horticultural buildings." An air-heating stove is employed to heat the air, which is conducted into a flue running from end to end of the house. The flue is on the floor, and there are numerous small openings through the upper surface, or at one side of it. Valves cover the openings at any part of the flue. It is formed of brickwork covered with tiles, having small holes, up which the heated air supplied passes into the house. This flue should be near the front of the house. The passage of the heated air at any part of the flue may be regulated by covering any of the perforated tiles with slates. At the upper part are openings, regulated by grooves, in connection with the atmosphere for the passage away of air from the house. At the back is a flue leading to a chimney either at one end, or intermediate of the two ends, of the building. This chimney is for drawing the heated air along the flues; in it is an opening with a valve to regulate the speed by which the heated air is forced into the house.

[Printed, 4*d*. No Drawings.]

A.D. 1863, December 11.—N° 3124.

EPPS, Alexander.—" Improvements in malt and hop kilns " which improvements are partly applicable to the ventilation " and warming of buildings, and to the drying of various " substances."

The drawings shew a hop kiln, with a furnace in the centre of the ground floor. At the back of this furnace is a chamber, with which communicates a flue from the outside, and a number of pipes, the opposite ends of which open into a chamber in communication with the furnace. From this chamber branch out on each side series of pipes opening into the kiln, between which more air from the outside is made to circulate. Other passages lead from the outside into the kiln. In order to regulate the internal temperature, the upper part, below the floor, is furnished with a pipe, extending across the whole building, perforated with holes throughout its length, and with both its ends opening into the atmosphere; but covered by caps of perforated zinc, and fitted with valves opening outwards.

This perforated tube may either be placed near the roof or the floor of the kiln or building or apartment to be ventilated; and it extends from side to side or from one side only. When the tube is placed near the floor, the valves are made to open outwards, and in the contrary direction when near the ceiling. The end valves may be in the form of hinged doors, with a small weight so made as to slide along the valve by means of an adjusting screw.

[Printed, 10*d*. Drawing.]

1864.

A.D. 1864, January 12.—Nº 89.

WELCH, WILLIAM.—"Improvements in mechanical apparatus "for propelling, navigating, and governing ships and other pro"jectile bodies, applicable also to ventilation." They primarily relate to a form of screw propeller which, used as a screw fan, can be applied "for ventilating ships, mines," and also for blowing.

The drawings show a form of two-bladed screw propeller; and the inventor refers to his previous patent, No. 2584, A.D. 1861, as containing a "descriptive geometrical theory," which he here developes in practice.

In "ventilation and blowing the apparatus is simply driven at "the entrance or exit of the openings of one or more passages "or conduits." "Any number of the apparatus may be used on "one body." The blades are adjustable on the shaft.

[Printed, 1*s*. Drawings.]

A.D. 1864, March 10.—Nº 603. (* *)

BOYLE, THOMAS.—(*Provisional protection only.*)—"An im"proved air and smoke valve" consisting of a "swinging valve" of "flexible material hanging vertically when at rest before a "*diagonally*-formed opening." "This valve is intended to be "*applied* as a ventilator to chimney breasts, into chimneys be-

"tween interior rooms or apartments of any kind, or between "these and the open air." For "a chimney breast ventilator" "an oblong cast-iron box" is made with both ends "open and "parallel with each other." "On one end a flange is thrown "outwards to a right angle with the sides of a sufficient width to "cover over the sides of the aperture in the wall." A second similar box fits in the first. It has less depth, "and its inner "opening" is cut off obliquely from top to bottom through the two sides. On the sloping opening "a flange is thrown inwards "from each of the sides." When a valve of a flexible material is used, a grating is placed "in the space within the flanges as "a support across the back of the valve." It is secured to the top edge of the flange only, and can thus move to and fro. The second box with the valve thus attached to it is inserted within the first, and the valve works within the covered area of the first box.

[Printed, *4d.* No Drawings.]

A.D. 1864, March 12.—Nº 621.

SIMESTER, Hugh, and BAINBRIDGE, John.—"Improvements in register stoves or fireplaces and furnaces, conducing "to the consumption of smoke, and applicable to warming, ventilating, cooking, and other purposes." The portions bearing on ventilation relate to register stoves for dwelling rooms.

Fire-places and furnaces generally are supplied with both the fuel and the air at the upper part; the air-supply descending through the fire in its progress to the flue instead of upwards. To insure the combustion of the gas passing away from the lower part of the fire or from the opposite side to that at which the air is admitted a further admixture of air is provided for in the chamber or flues through which it subsequently passes.

In the case of an ordinary chamber fire the fire-place is formed like a register stove; but instead of solid fire-bars and back and sides with grating at bottom, the space containing the fire is constructed of a series of upright tubes all round, fixed at their lower ends in and open to a chamber, having communication with the supply chamber of the air, the upper ends being held by a horizontal bar at top, level with or above the height of the fire. Behind the back and side tubes are disposed a solid back and sides, but leaving a space between to form a combustion chamber, and at bottom is the escape of the gases into the flue. Surrounding the solid back is the flue space, and around or through that space an air chamber for heating the air to be supplied to the room through a ventilator, and also to the fire through the tubes before mentioned for combustion. A horizontal diaphragm separates this air chamber, the hot air being supplied to the room from the upper part by a regulating valve, and the cold air to the fire from the lower part. This chamber is in communication with the external atmosphere, either by a channel in the floor or wall or in the skirting of the chamber; the room may also be supplied with cold air from this source, a valve being provided for the purpose. The lower part of the air chamber more immediately surrounds the ash-pit. The ordinary register opening of the register stove is retained, but only opened for occasional use. When this is closed and the fire lighted the draught is downwards in the fire which carries the products of combustion between the surrounding tubes into the first space or combustion chamber, and thence under the back of same into the upward flue space. A damper is provided in the flue to regulate the draught. A coil of pipes may be placed in the combustion or flue chambers to heat and circulate water for baths. The air for supplying the fire tubes may be drawn from the room if desired; in either case it will be heated before being emitted all round at the level of the top of the fire. The fire is supported on a solid bottom.

The drawings, which should be consulted, show different forms of kitchen ranges and steam boiler-furnaces, as also other modifications of ventilating register stoves.

In one case the front tubular fire-bars rest on a plate in front open to the room; and then communicate with an upper horizontal tubular fire-bar at their tops. A second row of tubes at the back of the grate open into the combustion chamber at the back.

In another instance the tubular bars at the back rest on the channel in front, the front bars being horizontal and communicating with the channel by hollow upright bars supporting them at their ends.

Instead of the tubes at the back and sides being of iron, the back may be composed of fire-clay bars with air-channels, and so "formed externally that when placed together by vertical slots "are presented for the draught to pass."

[*Printed*, 1*s*. 6*d*. Drawings.]

A.D. 1864, March 16.—N° 666.

HOLT, Robert.—(*Provisional protection only.*)—" Improve-" ments in the manufacture of hoods for ventilators." They consist " in manufacturing the hoods of ventilators of terra cotta, " or other earthenware, instead of sheet metal." " The chimney " top is also made of terra cotta, or other earthenware, as in " chimney tops without hoods." " The pivot for the hood is " made as usual."

[Printed, 4*d*. No Drawings.]

A.D. 1864, March 16.—N° 675.

WAKEFIELD, Edward Thomas.—" Improvements in gas " lighting and ventilating apparatus." The flame gases from a gas flame are conducted by means of a pipe into the chimney or flue of the fire-place of the apartment within which it is placed. An argand gas burner is shown surrounded by a glass chimney; over this is placed another pipe, of porcelain, glass, or earthenware; which, at its bottom end, is fixed to a transparent glass shade, and, at its upper end, to a horizontal pipe running below the ceiling, and communicating with the chimney flue. The horizontal pipe may be fitted with a valve.

[Printed, 10*d*. Drawings.]

A.D. 1864, March 18.—N° 694. (* *)

CHANTRELL, George Frederic, and REYMOND, Jean.—" Improvements applicable to chimney tops and ventilators, and " in the manufacture thereof," consisting in surrounding the tops with an outer casing, contracted at the top. The intermediate space is divided into air passages by vertical diaphragms. At the base are a number of oblique air passages. These ventilators or chimney tops may be manufactured in two pieces, by moulding the outer casing in one piece, and slipping it over the head of the vertical shaft.

[Printed, 8*d*. Drawing.]

A.D. 1864, March 26.—N° 762.

LEVER, Ellis.—" Fixing hoops in the interior of flexible tubing " employed in the ventilation of mines and other similar pur-" poses." Hoops of steel or wood are placed inside the tubes, at distances apart varying according to the diameter of the tubing or the positions and places to which it is to be applied. These hoops are rivetted or bolted to the flexible material during the operation of sewing. To some of these rivets or bolts is attached a ring "or partial ring" to hang outside the tubing, so that by putting these rings on nails driven into the sides of the mine or otherwise, or suspended in the shaft by ropes through the rings, the tubing will be kept in its proper place. To prevent damage to the flexible material by the friction of the shoulders of the hooks, bolts, or rivets, "a washer of leather is placed between "them."

[Printed, 4*d.* No Drawings.]

A.D. 1864, March 28.—N° 770.

HENRY, MICHAEL.—(*A communication from Benoist Rouquayrol.*)—"Improvements in apparatus for supplying air to persons "employed under water, or in places where noxious gas, air, or "vapour prevails." The apparatus mainly consists of a portable receiver of compressed air to be carried on the back of the person to be supplied with air for breathing; and the air is compressed by a peculiar form of pump.

A portable air receiver is made with a recess closed by a cover of elastic material, such as caoutchouc. This recess, thus forming a second chamber, communicates with the main receivers by an orifice, opened and closed by a valve worked by a rod attached to the elastic plate in such wise as to open the valve when pressure is exerted on the plate. "The outflow of air may be regulated "by combining two such contrivances." "The boxes may be "surrounded by a casing and springs used for pressing on the "plates. A tube leads from the air vessel to supply the workman "who may wear a mouthpiece consisting of a strip of caoutchouc "held between the lips and teeth. The action of the air valve is "preferably so regulated that the same air may be breathed "twice." The drawings show a portable apparatus with one air-box, and another with two air-boxes and two communicating receivers.

The air compressing apparatus consists of two, four, or more movable cylinders, worked up and down on pistons, jointed below to the framing, so as to oscillate when the pump barrels are worked up and down. The pumps are of different sizes, successively forcing the air from the largest to the smallest, and thence into the receiver; water being injected on to the top of the pistons from a force pump; the whole being worked in the manner of an ordinary hand fire-engine. A smaller pump is shown with two barrels of equal diameters.

[Printed, 8*d*. Drawing.]

A.D. 1864, March 30.—N° 786.

LANG, JOSEPH.—(*Provisional protection only*.)—"Improvements in the ventilation of mines or subterranean passages." They consist in exhausting the impure air or gases accumulating in the passages, and thereby causing pure air to become supplied instead. This is to be effected by arranging pipes throughout the workings which at certain distances are open by perforations to receive the impure air. These pipes are to be connected to an exhausting fan, outside the mine, so that the impure air may be extracted.

[Printed, 4*d*. No Drawings.]

A.D. 1864, March 30.—N°. 790.

WALLER, THOMAS.—"Improvements in apparatus for heating "air, and in valves for admitting heated and cold air, and "regulating the supply thereof."

In order to heat the air, a metal casing is placed at the back of a stove, and connected with it. This casing has an inlet for the air at the bottom or its sides, and outlets at its upper part, which are connected with pipes directed to any required point. At the middle of the box are horizontal plates, towards which a number of inclined plates converge, and past which the air is caused to traverse on its way to the outlets.

The valve for regulating the admission of air, whether hot or cold, consists of a cylinder, with parts cut away from it, and revolving in a casing somewhat on the principle of a tap with a passage up its axis. This valve is placed at the outlet of a duct divided into two parts, one for the cold and the other for the heated air. The outlet of the valve is fitted with an open-work plate; but at the periphery of the casing is an index; so that by turning a handle on the axis of the cylinder, the valve can be set to admit either hot or cold, or both hot and cold air.

By arranging the ducts apart at an angle of 90°, the hot or cold air can be admitted to the under part of the cylinder.

Instead of an open-work plate at the opening of the valve into the apartment, a solid plate can be set somewhat beyond the outer edge of the valve, so that the air can pass round this edge and the back of the solid plate.

[Printed, 8*d*. Drawing.]

A.D. 1864, April 2.—Nº 831.

RICHARD, THEODORE.—(*Provisional protection only.*)—" Im-" provements in apparatus for warming and ventilating." They consist in an arrangement of enclosed stove, whereby two or more rooms may be simultaneously warmed and ventilated. The stove, of the ordinary circular form, is surrounded with a close cover between which and the stove air circulates; by preference it is placed against or between the walls. For each room " an opening " is provided at the upper and another at the lower part of the " cover," in order that the air it contains may be put into communication with the air in the room separately at the upper and lower openings. These openings are provided with adjustable doors, whereby either of the two or all of the rooms may be ventilated, and more or less warmed. The stove may be supplied with fuel from one or more rooms, through doors opening into the interior or exterior of the cover. In some cases one part only of the stove is enclosed by the cover, whilst the other part projects therefrom. A stove so arranged is placed with that part which is enclosed by the cover in one room (or in communication therewith), the unenclosed part being placed in another room. To protect the cover from the fire, screens or a second cover may be employed. To save fuel, the flue may be coiled around the interior of the cover. Most of the covers of stoves now in use may be employed.

[Printed, 4*d*. No Drawings.]

A.D. 1864, April 5.—Nº 847. (* *)

McLAINE, ALEXANDER.—" Improvements in the construction " and ventilation of ships and vessels."

In the first part of the Specification the inventor describes his improved method of constructing vessels. He then states that " the object of the second part of my invention is the ventilation " *of* vessels described as aforesaid, and other suitably constructed " *vessels*. This part of my invention consists in driving air

" through the keelson or keelsons, thence through apertures in " it or them, into the spaces between the frames, then up through " the frame spaces, and out by apertures in the iron ceiling at " a higher level into the hold, the 'tween decks or other portions " of the inside of the vessel, or through apertures communicating " directly with the outer atmosphere; all or part of the said " apertures are, by preference, fitted with gratings and adjustable " covers to regulate the amount of ventilation. I sometimes " reverse the currents of air, and draw instead of drive them as " aforesaid."

[Printed, 8*d*. Drawing.]

A.D. 1864, April 11.—N° 904.

GEDGE, WILLIAM EDWARD. — (*A communication from Jean François Maumenée and Alfred Dalifol.*)—This invention relates to " improved means of and apparatus for condensing steam," and " one of the apparatuses" for this purpose " may also be applied " to drying and ventilating with hot air, and to heating public " buildings." Its leading feature consists in effecting the surface condensation of steam contained in the tubes of the condenser by means of a current of air drawn by a fan past the outsides of the tubes. When a prime mover is employed to drive the fan, the apparatus is claimed to be peculiarly applicable to heating large public and private establishments and workshops, and to drying by hot air.

The surface condenser through which the steam is led in order to be condensed, and at the same time to heat the air, consists of a serpentine formed of a number of branches, each of which is again formed of a number of smaller tubes. The steam is conducted to and fro by means of partitions, through each of these branches in succession until it reaches the last. Between these the air is drawn. In order to bring the action of the fan to bear, the apparatus is enclosed in a sheet-iron casing. The steam enters at the upper part; and the air is drawn through the casing by the fan traversing the entire assemblage of tubes. The air may be saturated with moisture by means of a tube, placed longitudinally at the inlet opening and distributing water in a fine shower. The condenser is placed, at its lower part, in communication with a double-acting air pump in order to get rid of the water of condensation. The drawings should be consulted.

[Printed, 1*s*. 6*d*. Drawings.]

A.D. 1864, April 14.—Nº 937.

STEVEN, Thomas, and BATTY, Charles. — "Improve-" ments in arrangements and apparatus for ventilating, for pro-" tecting from heat, and for heating and cooking." They relate to inducing currents of air by means of heat for those purposes.

For inducing air into a room, a duct from the outside of the building is formed under the floor, communicating with an ornamental pedestal over the opening, having internal passages for the air and openings for its discharge into the room. The internal passages are made with flanges for the air to impinge against, and are arranged to enclose a central space to contain water, which is heated by an oil or spirit lamp, by gas jets, or by fuel. The products of combustion are carried off by two inclined tubes in the water space; the vapour from which can escape through an opening.

For discharging vitiated air from a room a passage is made completely across the building, above the ceiling or roof, from one side of the house or apartment to the other, and at each end, to the external atmosphere. This passage communicates with the room by an open ornament in the ceiling at the sides of which there are in the passage two valves, the one on the windward side closing to prevent ingress and the one on the lee side opening for egress. If, however, it is preferred to discharge vitiated air by a vertical passage, a pyramidal hood, with apertures in the sides, is applied to the outlet.

Similar pyramidal hoods may be applied to chimneys or smoke vents.

For obtaining inward and outward air currents or inward currents only through the ceiling or roof of a room or enclosed space, or through the deck of a ship, an apparatus, rectangular in horizontal section, is externally applied. Two vertical passages, formed in the centre, communicate below with the space to be ventilated and above with opposite sides of the apparatus, which are fitted internally with curved and inclined plates and flanges arranged to direct impinging currents of air into the inlet passage on the windward side. The vitiated air escapes by the other passage, provided with a revolving or pyramidal hood, or by separate apparatus situated at a little distance. Or one of the vertical passages may be made to act as the downcast, and the other as the upcast, shaft.

For ventilating sewers, the bad air is withdrawn at points near the outfall or at the bottom of an incline, so that the air currents in the sewer shall coincide with and be assisted by the currents of water. The bad air is withdrawn and discharged by two chimneys, each fitted with a central internal tortuously arranged flue carrying up the products of combustion from a furnace, a portion of the air from the sewer passing through such furnace. Each furnace compartment can be separated from the other.

A hot-air stove is formed with a central fire-box, supplied with fuel at the top. The products of combustion pass off by an annular space surrounding the lower part of the fire-box with the ash-pit or air-inlet space, and finally enter a flue passing under the floor. The air to supply the stove is either taken from the room or through a passage from the outside, in which case the stove is set over the necessary opening in the floor. Advantage is taken of the interior of the flue jacket and the space beneath the fire to heat air, which enters the bottom of an internal jacket, and is discharged by passages from the upper part crossing the flue space. The outside of the stove is fitted with metal gills, horizontal or inclined, either alone or in combination with the ordinary vertical flanges. Openings are formed through the horizontal or inclined flanges.

Gill stoves are also mounted on a hollow box receiving air from the outside or by side openings, and supplying it to the gill spaces by openings in the top between the gills, and also to the fire-box by other openings.

" Angle-cheek register " grates are fitted across between the cheeks and near the back with a vertical plate forming an inverted syphon.

A plan for preserving safes from heat by means of currents of air, also different forms of cooking ranges or kitcheners, are described and shewn in the drawings.

[Printed, 2*s*. Drawings.]

A.D. 1864, June 11.—N° 1450.

WALKER, Augustus.—(*Provisional protection only.*)—" Im-" provements in the construction of steam and sailing vessels for " naval and merchant service, and in the mode of arming and " working the same." They consist amongst others in the peculiar manner of mounting and sustaining the turret; and " in the device for ventilating the interior of the vessel." The turret is placed near the centre of the vessel, upon or within a casing. It may be constructed to revolve, or it may be stationary and secured to the casing and pierced with ports. It is constructed in two parts, the lower part, constituting the gun carriage, being made to revolve, while the upper part remains stationary. The "ventilation of the turret is provided by means " of two or more tubes extending from either side of the vessel " inwards and upwards in a curved form to the interior of the " casing. A series of apertures are made in the turret on a level " with the inner end of the tubes, so as to admit fresh air into " any portion of the turret. Any desirable number of the tubes " may be employed conveying in any direction forward and abaft " as well as to the sides of the vessel. These tubes are narrow " at their outer ends and square and larger at their inner ends." "Tubes are also employed for admitting air and light into the " hold and cabin of the vessel. The tubes for the hold incline " upward from the outside," and the tubes for the cabin and " state rooms may be closed by metal caps for excluding both " the water and shot."

"The dome-topped pilot houses, of which two are employed, " are constructed to slide up and down in the upper deck. These " houses constitute the only means of ingress to the interior of " the vessel, and being raised when the vessel is moving they " afford additional means of ventilation and an unobstructed " look-out."

[Printed, 4*d*. No Drawings.]

A.D. 1864, June 23.—N° 1574.

FRANCIS, Edward.—(*Provisional protection only.*)—Packages for tobacco and other articles liable to heat are ventilated by dividing them into parts by open wirework, or perforated plates of metal, and forming them with air valves at the tops and bottoms or in the sides.

The perforated partitions, in the case of square packages, may be made to slide into grooves formed in the sides; and with those "of a cylindrical or other form they may rest on " ledges, or be held in position by spring catches, or the edges of " the perforated" "frames may be held in position by being pro- " vided on the edge with studs, which take into openings formed " *in the inside* of the outer casing, and be held in position by a " *small bolt* or spring catch." A "spring catch" "may be formed

" by bending a piece of wire or slip of metal, so as to form a recess " to receive the edge of the perforated plate or openwork frame, " and securing one end thereof by turning it at a right angle," and securing it to the sides of the package. "This spring catch " may consist of a piece of wire or slip of metal bent to a form " like that of the letter V or U, and formed with an arm projecting from the top of each limb at an angle, and of such a length " as will allow them to be in contact with the sides of the " packages," " one end of which is secured thereto, and the other " allowed to play freely thereon."

With "a cylindrical package, a wirework or perforated grating " is placed a short distance from the bottom; then the requisite " quantity" of " material to be preserved is placed thereon, when " a second grated or perforated partition is introduced." "Then " a further quantity of the material is introduced into the " package; when a third grating is inserted, and so on;" introducing the last openwork frame or plate, " so as to prevent the " contents of the package being in close contact with the cover."

"In lieu of the perforated or openwork dividing plates or stages, " open-ended tubes" may be used, perforated with jet openings, or formed of wire gauze, which will allow the air to circulate therethrough. " In this modification the perforated or openwork " tube is formed the full length of the interior of the package," and is placed in its interior, so as to pass through the centre of the contents. The air valves are placed so as to open into the interior of the perforated tube.

In the case of large packages, two or more of these perforated tubes may be used placed concentrically to each other, and in which additional air valves may be used.

[Printed, 4*d*. No Drawings.]

A.D. 1864, July 1.—N° 1641. (* *)

LANGTON, John.—(*Provisional protection only.*)—" Improved " means of ventilating railway and other carriages, ships, and " other conveyances passing through the air." The means consist of " a perforated tube or channel or pipe with apertures " carried across or through the carriage or other compartment " to be ventilated. With this perforated tube or pipe I employ " two open-mouthed pipes connected to the perforated pipe by " tubing, and I carry the open-mouthed pipes outside of the " carriage or other compartment. The mouths are bent or "directed in opposite directions, so that when the carriage, for "instance, is travelling in one direction one mouth shall be "towards and the other from the wind. Inside the connecting "tubing I fit valves for regulating the flow of air through the "apparatus."

[Printed, 4*d*. No Drawings.]

A.D. 1864, July 8.—N° 1701.

ROGERS, Abraham.—"Improvements in means or apparatus "for supplying fuel or heat to steam boiler or other furnaces, "applicable also for ventilating mines and similar purposes."

An ordinary furnace is to be fed with gas from a coke oven. The oven is so placed that its products of combustion pass into the ordinary furnace which is in connection with and fed by coke from the oven.

Coke ovens are also to be erected at the top of the ventilating shaft of a mine in such a manner that the ovens will "draw the "foul air from the mine. The oven is arched over and a flue "formed above the arch, and thence to the top of the shaft, with "openings to the burning fuel."

Ordinary furnaces of locomotive, stationary, or marine boilers may be converted into coke ovens by charging them with coal in a similar manner and igniting it at the front or feeding end. This is applicable to bakers' ovens, stoves for warming churches, chapels, and dryers' pans, where a constant supply of heat is required.

In ventilating mines one or more coke ovens are constructed near to the top of the ventilating shaft of a mine, and each oven is connected by a flue to the covered-up top of the shaft. "The "flue from the shaft passes over the coke oven (with apertures "opening to the burning fuel), thence passing along to the "chimney, the heat of the oven producing" a draught in the mine. "Or the flue from the ventilating shaft may enter the "oven," near its feeding end. "Coke ovens may also be applied "for ventilating mines by placing them at the bottom of the "shafts."

[Printed, 4*d*. No Drawings.]

A.D. 1864, July 9.—N° 1710.

***GREER*, Thomas John Joseph.**—(*Provisional protection only.*) —"*An improved ventilator.*" It consists of a semi-cylinder of copper wire gauze or perforated metal, fixed at its upper edge to the outside of the bead of the window frame at the top of the window. India-rubber packing is employed to prevent the air from entering by any other opening. A piece of strong wire makes "the joint between the two pieces of copper gauze, form-"ing the semi-cylinder through which the upper and lower "currents pass." This ventilator can be adapted by screws to any existing window or carriage. It may have its area increased or diminished by opening or closing the sash more or less.

[Printed, 4*d*. No Drawings.]

A.D. 1864, July 14.—N° 1757.

BOYLE, Thomas.—"An improved air and smoke valve," applicable "as an outlet ventilator for air or smoke," to "air and "smoke shafts for the prevention of back currents and down "draughts;" and hence to such purposes as "chimney breast "ventilators, ceiling ventilators over chandeliers or other lights, "ventilators in roofs or sides of buildings."

It consists of a modification of Dr. Arnott's well-known chimney breast ventilator, thin plates of mica being used for the movable flaps.

The drawings describe a cast metal frame with four apertures, on which are hinged as many flaps of mica, the whole being contained in a metal box to be built into the chimney breast. The flaps are suspended in such wise as to be at an angle against the inclined projecting edge of the frame.

[Printed, 6*d*. Drawing.]

A.D. 1864, August 3.—N° 1925.

JOHNSON, John Henry.—(*A communication from John Harris.*)—(*Provisional protection only.*)—"Improvements in machinery "or apparatus for propelling and steering ships, partly applicable "also to the ventilation of mines and buildings, to the pumping "of water, and to the obtainment of motive power." This invention relates, firstly, to "mechanism for giving a reciprocating "horizontal motion or an oscillating motion to a feathering "paddle for propelling or steering ships, such paddle being so "constructed that the vanes will be closed when the paddle is "moving in one direction, and open when moving in the contrary "*direction*;" "secondly, to constructions of feathering paddles."

According to one plan a vertical frame is employed, carrying at its lower end vanes fixed on vertical spindles and turning with them in the frame. The upper part of the frame forms a stem which is suspended from and free to swing upon a horizontal shaft, from which a rod is also suspended. The spindle which carries the centre vane is extended upwards, and at its upper extremity carries two tappets "which are acted upon by a fork " on the lower end of the rod herein-before referred to, when that " rod moves in relation to the frame, and when consequently it " turns the spindle, which is made to impart motion also to the " rest of the spindles of the series of vanes. Motion is com- " municated to this propeller by means of two arms carried on " two rocking shafts having the same amount of motion. One " of these arms is longer than the other, and gives motion " through a connecting rod to the frame of the propeller, whilst " the shorter arms gives motion, also through a connecting rod, " to the suspended rod" which actuates the feathering vanes. " In lieu of the two rocking shafts a crank and eccentric wheel " on the same shaft may be employed." "For connecting " together the spindles carrying the several feathering vanes, so " that on one of them being turned in either direction the same " movement will be imparted to the rest." Each spindle may be provided with a spur wheel, and all these wheels made to gear into one another; or a series of arms or levers may be fixed to the several spindles and coupled by connecting rods; or a small bar may be connected by a pin at one end to near the circumference of a wheel fast on the end of the spindle. The small bar is slotted at its free end, and through this slot passes a pin which is fixed to the framework between the wheel and the bar."

Another mode of communicating motion to the entire propeller when applied to the side of a vessel consists in the employment of a horizontal steam engine.

On "two horizontal guides are employed attached to any part of the ship, "along which guides the main framing of the pro- " peller is made to travel in a horizontal rectilinear direction."

"Either of the herein-before described forms of feathering " mechanism may be adopted and used for the purpose of putting " in motion a body of air as a ventilator, or of water as a pump, " or applied in substitution for water wheels, for the purpose of " *obtaining* motive power from running streams."

"*If it* be desired to use the apparatus as a prime mover two " *cranks* fixed in opposite directions on to one shaft are employed,

" each crank being accompanied by an eccentric wheel on the " same shaft for the purpose of actuating the feathering mecha- " nism." The crank shaft is to be parallel with and at any convenient distance from a second shaft, which is fixed over the stream from which the power is to be taken. On this last-mentioned shaft two frames containing paddles are suspended. Each frame is connected by a link with its corresponding crank. The eccentrics are connected by rods to the regulating rods which actuate the feathering mechanism." "The same arrangement is applicable as a ventilator, or as a pump for putting in motion air or water, in which case the power must be applied to the crank shaft."

[Printed, 4*d*. No Drawings.]

A.D. 1864, August 12.—N° 2007.

ALISON, Alexander, and SHAW, John.—" Improved elevators for raising water and minerals from collieries and mines, " and for other purposes." The general principle they embody is that of employing a close cylinder, reaching from top to bottom of a mining shaft, and containing a piston to be worked by air under pressure, the exhaust of which is used to ventilate the workings.

The cylinder reaches down the shaft below its bottom, and somewhat above its top. It contains a double-headed piston, between the two heads of which is a receiver for the miners and the mineral or water to be raised. Or a single-headed piston below the receiver may be used. A pump worked by a steam engine or water wheel forces air down a tube and thence below the piston; and the exhausted air, conducted by piping to the places where it is needed, drives the foul air before it up the air shaft, or up a division of the main shaft.

Or exhausted air alone may be used; or forced and exhausted air combined.

In the Final Specification there is disclaimed a plan whereby air is proposed to be "forced by an air pump" down a tube into one " or more cisterns in the bottom of the shaft into which the " water of the mine runs. The water is in this way forced up to " the surface through another tube. The cistern or cisterns are " fitted with self-acting valves, which open and shut by means of " a float. As the air escapes from the bottom this elevator acts as a ventilator."

[Printed, 8d. Drawing.]

A.D. 1864, August 12.—N° 2009.

DYER, HUGH.—" Improvements applicable to chimney tops and " ventilators, and apparatus for cleaning the same and flues " generally."

The ventilator has the same form of the chimney top here described; which is constructed with a square base, tapered upwards, and merging into a circular cross section. The top is made with two or more hollow branches, which extend towards to about half the entire height, forming on the top a shape with a semi-circular outline. When used as a ventilator it is preferably " made of "molded glass" instead of metal or terra cotta. In one or more of the drooping branches pipes may be fixed, extending "below the base of the vertical shaft into the ceiling," or other position of the place to be ventilated. To ventilate more than one apartment, the drooping branches and vertical air shaft are divided into passages, "which will draw the fresh air through " the short branches and discharge the foul air through the longer " ones." Sweeping and brushing apparatus are described for use when this ventilation is to be used as a chimney top.

[Printed, 1*s*. Drawing.]

A.D. 1864, August 20.—N° 2067.

WALKER, JOHN.—" Improvements in ships of war and batteries, and in mounting, working, and covering guns to be used " therein." " Forts " are also alluded to.

The guns are to be mounted on platforms carried by plungers, which are raised and lowered by hydraulic pressure. The platforms are to be placed along the ship's centre line, the upper platforms being rotative on a vertical axis, in order to be run up to the port-holes in tramways. The inventor also proposes to fire the guns through "elongating tubes" extending "from each side " of the ship towards the" "mouth of the gun." "The end " which receives the mouth of the cannon" is formed "with a conical bore, and "the main bore larger than the bore of the gun, " so that some of the gases evolved by the ignition and explosion " of the powder may partially pass the projectile, and the air be " allowed to rush in at the conical mouth as the gun recoils or is " discharged." The tube "carries the smoke out of the ship " or fort, and acts as a ventilator."

The sides of war ships and batteries are to be covered with a belt of armour "formed with suitable port-holes for the tube."

"The upper deck and upper firing platform and roof are covered "with a shot and sheet proof plating, and the ribs of the ship "and belt are made hollow to allow for ventilation." The drawings show the roof of the proposed gun-deck house formed of ribs of a horse-shoe shape in cross-sections, covered with plates projecting over the side all round, and drooped, to prevent shell splinters "entering through the hollows." "Through the hollow "ribs the air has free course to pass to or from the exterior, and "they thus operate as ventilators. The deck is covered in a "similar manner."

[Printed, 2*s*. Drawings.]

A.D. 1864, August 23.—N° 2076.

BOGGIO, Gerin Gabriel.—"A new or improved process for "extracting the oil contained in the flour of oleaginous seeds, for "distilling, rectifying, and evaporating volatile substances, for preparing volatile oils or essences and extracts for dyeing and "medical purposes, for dessicating animal and vegetable alimentary substances, plants, roots, and flowers, and for ventilating." It "relates to divers applications of the vacuum by means of a "pneumatic machine or other similar apparatus or means." The substances are placed in receivers, which are "in communication "with the suction valve of a pump chamber, or with bellows with "suction and forcing valves worked in the ordinary way." "In "order to ventilate places in which the air penetrates with difficulty, "such as cellars, holds of vessels, and similar places," the patentee proposes to "take the outside air by means of the suction valves "of pumps or bellows, and introduce it by the driving valves, "either in large volumes or divided, and in this case the "disengaging tubes serve for carrying off the foul air."

[Printed, 4*d*. No Drawings.]

A.D. 1864, September 16.—N° 2264.

HOLT, Robert.—"Improvements in the manufacture and con"struction of hoods for ventilators." The revolving hoods and the vanes of ventilators are manufactured of terra cotta or other earthenware instead of sheet metal. In constructing such revolving hoods a small opening is made through the back of the hood opposite the main orifice, and it is covered by a screen. The chimney top is also moulded of terra cotta or other earthenware, as in chimney tops without hoods of the present construction; the pivot for the hood is made as usual.

[Printed, 8*d*. Drawing.]

A.D. 1864, September 29.—N° 2393.

DEFRIES, COLEMAN.—(*Provisional protection only.*)—"Improvements in lighting and ventilating." They refer to the lighting by gas of public buildings, theatres, and music halls, and also to the ventilation of the space between floor and ceiling.

In the case of a music hall with level ceiling and ordinary bent card roof, the ceiling is divided into squares by iron joists, and between each joist is an open space, varying in width according to the area of the ceiling. Between ceiling and roof is the lighting apparatus, composed of a series of sun lights under covers, constructed in the shape of an inverted funnel. The inner part of each of these metal shades is galvanized; and the pipes are led into other converging pipes, and finally into a horizontal cylinders which traverse under the entire roof, and have exits into the open air. These cylinders are furnished with cowls for aiding the exit of the products of combustion. The larger spaces of the ceiling are filled with squares of glass; the oblong apertures with moveable prisms of glass placed crossways to the length of the aperture; and the square openings formed by the meeting and crossing of the joists with cut-glass lustres are made in openwork.

The plan is also "applicable to ceilings in compartments or "stages, and the openings for ventilation, by means of prisms "and lustres, may be of any form or size;" or the openings may be filled with perforated glass or slips of glass.

[Printed, 4*d*. No Drawings.]

A.D. 1864, October 4.—N° 2435.

CALLARD, THOMAS KARR.—(*Provisional protection only.*)—"Improvements in ventilators." They relate to window ventilators, and principally to such as are placed temporarily. The ventilator is made in the form of a tube of perforated zinc, of an oblong form in cross section, the breadth being such as to be received between the beads of a window, while the depth is according to the area required. "When the ventilator is applied

" temporarily, the window sash is lifted and the ventilator placed " below the sash between the bands." It extends across the window, occupying the space opened by lifting the sash. It may be similarly applied at the top, the sash being then lowered. In these ventilators are partitions of perforated zinc, in order to prevent draught into the room. The perforations at one part of one surface are disposed opposite the solid parts of the other. In order that the length of the ventilator may be adapted to various breadths of windows, the ends are made with pieces of tube slid on, so that it may be elongated as required.

[Printed, 4*d*. No Drawings.]

A.D. 1864, October 6.—N° 2453. (* *)

BROWN, THOMAS.—" An improved cap designed for increasing " the upward draught of chimneys and for ventilating ships and " buildings." This improved ventilating cap consists of an inner and outer cap, the inner cap being closed at the top, and having apertures at the sides protected by the external cap, which is open at the top and bottom, the sides of the two caps being inclined and adapted to each other and to the current of external air, so as to insure the deflection or reflection of the outer and the free passage of the inner current from the building, chimney, or place to be ventilated.

In applying this apparatus to a ship, the ventilators " are applied over the forward hatchway, engine-room, and after saloon, " and the chimney caps over the smoke pipes."

[Printed, 10*d*. Drawing.]

A.D. 1864, October 28.—N° 2666.

LAIDLAW, DAVID, and ROBERTSON, JAMES.—" Improvements in exhausting, forcing, compressing, heating, cooling, " and applying aeriform bodies, and in apparatus therefor." The machinery described consists of a great variety of gas exhausters for gas-works, gas or air pumps for compressing air intended to give out motive power, or to be used for freezing water or cooling generally, and ventilating. Complete freezing machines are shown, as well as different combinations for compressing illuminating gas into portable vessels, exhausting gas or air, for impelling it through passages, for impelling and, at the same time, heating air for drying and ventilating. The specific use or not of some of the apparatus for ventilating is not always expressly stated; and the drawings should be consulted.

One form of a reciprocating pump described for compressing air resembles an ordinary steam hammer, the plunger being fixed to the lower end of the steam piston rod, "or to the moving "cylinder if such is used, whilst the compressing cylinder is "placed immediately under the steam cylinder. There is no "crank shaft, and the steam valves are worked by gearing similar "to what is applied to steam hammers." Or the valve gear may also be worked by a small steam engine. To absorb the heat generated by compressing the air, the cylinder and passages are cooled by means of channels through which cold air or water is forced by pumps worked from cross-heads fixed to the main piston rods. Or cold water may be at once admitted into the cylinder and passages. The compressed air may also be cooled by being passed through a sort of "surface condenser, or like a reverse "current refrigerator, and part of the cooling surface may be "acted on by" the cooled air after being used. The compressed air may be divided into two or more jets, arranged to meet each other from opposite directions. Or the compressed air may be forced through water before entering the tank where it is to be utilized.

"If the compressed air is to be used for cooling buildings or "apartments it may, after being cooled, be allowed to escape by a "suitably loaded valve directly into the space to be cooled."

Or "it may be made to act in a turbine so as to drive a fan for "drawing in air from the atmosphere."

Or the compressed air "may be discharged in a jet form in a "channel" "admitting air from the outside."

A combination for impelling and, at the same time, heating air for drying and ventilating, consists of a steam turbine, fixed on a vertical spindle in a line with a centrifugal air blowing fan. After the steam has passed through the turbine, it is led through a number of tubes, past which the air to be impelled by the fan is exhausted by it, thus getting heated. In a modification of the combination of the steam turbine and the blowing fan, the casing of the fan is formed with two outlets, so that a discharge pipe may be connected to either, the others being closed by a cover.

Amongst the forms of reciprocating apparatus for exhausting *or impelling* air or gas is a combination of an ordinary double-*acting* pump worked by a steam cylinder. Or, instead of the pump, an inverted vessel, working in a water lute similar to that of a gasholder, is actuated by the steam piston rod.

[Printed, 2*s.* 6*d.* Drawings.]

A.D. 1864, November 24.—Nº 2932. (* *)

KISSACK, JOHN.—"Improvements in warming and ventilating "apparatus." An ordinary furnace is formed with air-tight doors, provided with slides for regulating the supply of air for combustion. The products of combustion "are led over and alongside "the arch" of the furnace into flues, where a number of pipes are arranged horizontally, into which they pass; are led by elbow pipes into return pipes, and by other elbows into pipes by which they are conveyed into the chimney. The fresh air enters under the ash-pit into the space around the pipes, is thereby raised in temperature, and carried off by flues to the place where it is utilized. Or, by lengthening the ends of the pipes beyond the front of the furnace, the fresh air could be made to pass through instead of outside these, and get heated by the action of the products of combustion on the outside of the pipes.

[Printed, 10*d.* Drawing.]

A.D. 1864, November 24.—Nº 2934.

SANG, FREDERICK.—(*Provisional protection only.*)—"A ventilating cupola chandelier." Over each chimney of the burners is fixed a trumpet-mouthed tube, a series of which converge to a central vertical flue over the centre chimney, which also terminates in a bell-mouth. Each of these tubes is surrounded by an outer casing for the admission of an upward current of cold air. These casings are united in one main tube surrounding the vertical hot-air tube from all the burners, and openings are made in it near the ceiling for the entrance of the outer current of air. Openings at the top of the outer and inner tubes, close to the roof, allow any heated air outside the chandelier to pass into the flues. The vitiated air is conducted within the floor or roof to the chimney or other outlet.

[Printed, 4*d.* No Drawings.]

A.D. 1864, November 25.—Nº 2949.

GRUNDY, JOHN.—"Improvements in apparatus for heating "rooms or buildings."

A cast-iron stove, communicating by a flue with the chimney, is surrounded by a casing of brickwork or earthenware, an intermediate space being left into which air passes from the outside in order to be warmed by contact. The intermediate space opens into pipes, which conduct the air to the outside.

The stove is in one casting, except the grate, which is in two pieces in order to pass through the nozzle by which fuel is fed in. The air apertures may be in all the walls; and air may also be supplied from the outside of the building into the intermediate space by means of underground passages. The hot air pipes may be of large diameter, and the exit of the air is regulated by dampers.

[Printed, 8*d*. Drawing.]

A.D. 1864, December 17.—N° 3133. (* *)

BROOKES, William.—(*A communication from John Theobald Hancock.*)—" Improvements in steam blowers." This invention has for its primary object the production of a blast for furnaces, &c. " Its secondary objects are the ventilation of buildings, ships, " and mines, and for promoting the evaporating of liquids." The apparatus consists of a series of pipes perforated with small holes turned towards the furnace, and connected with a main steam pipe, the whole being contained in a conical or cylindrical tube. It is inserted into the wall of the ash-pit; on closing the door of which, and on letting on the steam, the jets induce currents of air up the tube between the spaces of the smaller tubes, and the mixture forces itself into the fire. A rectangular section of chamber having parallel tubes with perforations at the ends may also be employed.

" When the apparatus is used for ventilation, the foul air must " of course be drawn into the blower, and then discharged there- " from into the open air or otherwise disposed of."

[Printed, 8*d*. Drawings.]

A.D. 1864, December 29.—N° 3230. (* *)

EDWARDS, George.—" Improvements in pneumatic apparatus " for raising materials, and other purposes."

In this invention a piston is used, which is of such dimensions as nearly to fill the shaft of the mine or other situation in which it works, being surrounded by a packing composed of fibres arranged in the form of a brush, or a fibrous pad, which is kept in contact with the walls of the shaft by the pressure of air. The articles to be raised or lowered are placed on the piston, and the latter is made to ascend the shaft either by exhausting the air from above it, or compressing the air below it. The piston carries beneath it a bucket furnished with a suitable valve, and each time the piston descends to the bottom of the shaft it enters a well formed there for the reception of water, the valve then opening and allowing the bucket to become filled therewith, such water being discharged into a syphon when the piston rises to the top of the shaft. For exhausting the air from the shaft, or compressing it therein, any kind of air pumps may be used, but the patentee states that he prefers a pump composed of an inner cylinder surrounded by a spiral or spirals, and forming an Archimedean screw, this working in an outer cylinder. Various modes of arranging and applying this pump are described, and the details of the othe parts of the invention are also modified according to the situation in which the apparatus is meant to be employed.

" The invention is useful for ventilating mines or pits by draw-
" ing from or forcing air into them."

[Printed, 10*d*. Drawing.]

1865.

A.D. 1865, January 11.—Nº 95.

CHIDLEY, Rock.—" Improvements in the construction of " railway carriages." They are so arranged as to form a saloon the whole length of a passenger train. The seats are arranged longitudinally; and at the ends of the carriages are passages connected by platforms, over which are sliding frames. Below the flooring, which is pierced with holes, is introduced a serpentine pipe supplied with steam from the engine. Air is admitted to the carriages through slots in the planking on the underside. Above these slots in the planking, and below the perforated flooring is fitted a slide extending along the whole width of the carriage. It is pierced with slots corresponding with those in the planking, so that the supply of air can be adjusted by shifting the slide by means of a chain passing over guide pulleys to a pulley receiving axial motion from a lever. To the slide may be given a tendency to return by tension springs, so that the lever may be kept in its forward position by means of a stop. For discharging the vitiated air there is formed, between the top of the compartments and the roof, an air passage connected with ventilators. The compartments of the carriage are connected with this air passage by perforations, and on the roof are erected circular ventilators, each below a cowl that can turn with the wind. Each circular ventilator is adjusted by means of an endless chain passing from a pulley operated by a crank handle to a pulley on the valve spindle. Or clack valves may be placed in the roof so arranged that the valves which meet the wind will close, and combined with a pierced slide adjusted like that below the floor. One of these roof ventilators consists of two casings, one within the other, the adjustable valve working between the two; in the second form there is a single casing, with the valves outside, and hung so as to vibrate either from above or below.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1865, February 2.—N° 296. (* *)

JEFFREYS, Julius Saunders.—(*Provisional protection only.*) —"Improvements in armour-plated and other ships or vessels, "also applicable to fortifications generally." The invention consists "in constructing armour-plated vessels by placing a "number of tubes, of sufficient diameter that projectiles can "pass through them, across the vessel, such tubes being made "trumpet-mouthed so as to open out at either side of the vessel. "The surface of the vessel intervening between the openings of "two such tubes is by this means formed convex, so that a projectile on striking such convex part will glance off and pass "into one of the said tubes. The tubes and convex surfaces "may either be formed rounded or angular. The tubes passing "through the vessel may conveniently form the deck beams, "and by forming communications between the interior of such "tubes and the interior of the vessel they may also serve for "the purpose of ventilation.

"The trumpet-mouthed openings of the tubes, as also the "intervening convex surfaces, are made of sufficient strength to "be shot-proof, either by forming the trumpet-mouthed and "convex surface of one plate, or by making them of separate

" plates. By tying all the tubes passing through the vessel " rigidly together the vessel may be made of such strength as to " be applicable as a ram.

" The same construction of trumpet-mouthed tubes and intervening convex surfaces may also be employed for fortifications " generally. The projectiles passing into such tubes may be conducted into shot-proof spaces in connection therewith, such " tubes passing through the sides of the vessel, arranged either " transversely or longitudinally, may be employed simply for " purposes of ventilation, irrespective of armour-plating, for men-of-war or for merchant vessels, and the openings of the tubes, " both in this case and the before-described application, may " be provided with slides or sluice valves so that they may be " closed in heavy weather."

[Printed, 4*d*. No Drawings.]

A.D. 1865, February 6.—N° 332.

BEARD, Charles.—" Improvements in apparatus for ventilating horticultural and other buildings." They principally relate to modes of adjusting the glazed openings at the tops of the buildings.

Along the upper angle of the roofs are glazed frames, hinged at their upper ends to the upper part of the roof. To these glazed frames are fitted connecting rods, pin-jointed at one end to their lower parts, and at the other, to a rod or a tube running from end to end of the ventilating apparatus. This rod or tube " may be connected to rings or slides which slide on uprights " " fixed at intervals along the greenhouse under the ridge of the " roof. These rings or slides are connected with others, on the " same upright, which are weighted to counterbalance the frames " of the ventilating apparatus."

Or a screw thread may be formed at one end of the rod or hollow tube, taking into a corresponding nut. On this nut there is fitted a bevilled pinion, driven by another bevilled wheel on an upright shaft turned by a handle. Or the endwise motion of the horizontal bar may be given by a lever to which one of its ends is connected. The lower end of this lever takes into notches in a bar or plate fixed to the wall in order to thereby set all the frames in any position.

In the case of a dome-shaped conservatory or building, the glazed frames are turned up and down somewhat on the principle of an umbrella frame. The frames are pin-jointed at their lower ends to rods which, at their other ends, are pin-jointed to the upper end of a tube capable of sliding up and down on an upright rod or a tube, and of being fixed in any position by a pin passing into one of a series of holes in this upright stem.

Any number of the glazed frames of a span roof or other form of building may also be operated in a similar manner.

[Printed, 10*d*. Drawing.]

A.D. 1865, February 15.—N° 433. (* *)

LUNGLEY, Charles.—" Improvements in ventilating blinds " or screens, and in means of ventilating ships and vessels," " My invention consists in constructing blinds or screens with " alternate fixed and movable laths or battens, or with part of " the battens fixed and part movable."

" I construct the battens of such shapes that when entirely " open the air shall not have direct access through the screen, " while the air admitted may be regulated by causing the movable " battens to move or slide and more or less close the apertures " between the battens."

" For ventilating ships, I fit ventilators at the bottom of cabins " in the form of a trunk or pipe with openings therein, and fed " by air made in some cases to pass in tubes through refrigerators " or tanks made to communicate by pipes with the sea or external " water, so as to allow of circulation therein of water from the " sea, or in cases of paddle-wheel boats through a refrigerator " placed in the paddle-box, or a place near thereto. In some " cases I employ a pump or fan to drive the air through the " refrigerating tubes."

[Printed, 1*s*. 8*d*. Drawings.]

A.D. 1865, February 23.—N° 509. (* *)

HASELTINE, George. — (*A communication from Augustus Walker.*)—" Improvements in ships of war, partly applicable to " ships designed for the merchant service."

The part relating to this subject is as follows :—" In venti- " lating the turret and other parts of the ship by means of curved " tubes extending from either side of the ship to the casing or " to the lower part of the ship, air being admitted to the turret " through apertures formed on a level with the inner ends of

" the tubes, which terminate in the casing. Tubes may also " be employed converging from other directions. I preferably " make these tubes narrower at their outer ends, and square and " larger at their inner ends, to create a draft, and at the same " time to prevent the entrance of water."

The tubes incline upward from the outside, and under ordinary circumstances will in this way be protected from the entrance of water. The tubes by which the cabins and state rooms are ventilated may be closed by shot-proof caps, to exclude water and projectiles in rough weather or when in action. Sliding stanchions are also employed, which while the vessel is under way may project above the upper deck, but while in action are lowered down and thus constitute plugs which close the tubes.

[Printed, 1*s*. Drawings.]

A.D. 1865, March 7.—N° 636.

PERKINS, Loftus.—" Improvements in apparatus for heating " and cooling atmospheric air and other aeriform bodies, and for " heating ovens, and for heating and ventilating buildings." Their leading feature consists in using long tubes, closed at both ends, and containing water or ether which, caused to evaporate from the lower, ascends and is condensed at the upper, end.

Into a tube of metal, preferably steel, closed at one end, there is introduced water or ether, partly filling the tube. The water is heated, and the air pumped out, the other end being then soldered or wedged up. Clusters or also coils of such tubes are exposed at their lower ends to the action of heat, and the liquid, thus evaporated, transfers itself to the other end where, getting condensed, it leaves its latent heat behind. A building or room can be heated by a coil of such piping, closed at top, and communicating by its lower end with another coil contained in a vessel of boiling water, heated by a fire in the basement or elsewhere.

A similar set or coil is to be used for ventilating a building by being erected up at its top under an aperture leading to the open air, a current of air being admitted at the lower part of the room.

When the air is to be cooled, an apparatus is used, also similar, except that the portion of the coil formerly heated is now subjected to cold by immersion in a cooling liquid or exposure when moist to a current of air.

[Printed, 1*s*. 4*d*. Drawings.]

A.D. 1865, March 14.—Nº 719.

NEWTON, Alfred Vincent.—(*A communication from Daniel Somes.*) — (*Provisional protection only.*) — "Improvements in "securing low and uniform temperatures, applicable to public "and private buildings, also to refrigerators, coolers, and con"densers, and to ships and other vessels, and in the apparatus "employed therein," by means of the cooling power of the "earth at certain depths below its surface." Air and liquids are also to be cooled in a similar way, and by means of the compression and expansion of air. The improvements also relate to the construction of cooling apparatus for breweries and distilleries, and to cooling the air in packing houses and refrigerators.

In order to employ the temperature below the surface of the earth to cool the air in buildings, a current of water is conducted below the surface, and then caused to ascend to the building; or previously into a separate air-cooling chamber. When there is a stream of water with sufficient head, the cooling may be effected by carrying the water down into the earth through pipes lying at sufficient depths. The cooling of the air may be effected by means of pipes with water from the subterranean coolers flowing through them. Air pipes may be made to pass through the water pipes. To further cool the air and dry it, it may be compressed while it is cooling, and then expanded in the building. Where there is not water with sufficient head, a piston, rotary pump, or propeller screw may be used to raise it. By applying heat a system of warming can be combined with that of cooling.

In providing packing houses, store houses, preserving houses, and refrigerators with such cooling devices, the air cooled by the subterranean coolers may be compressed at the time that it is cooled, and then permitted to expand. In order to keep buildings cool, thick walls filled in with non-conducting materials should be used, or they may be multiple with air spaces between.

In constructing coolers and condensers for the wort in breweries, and for condensers in distilling, the cold water from the subterranean coolers is made to circulate through pipes situate in any part of the coolers. Condensers are to be constructed in such a manner that cold water from the subterranean coolers shall circulate in contact with the surface of the pipes containing the vapour or steam to be condensed. Ordinary condensers may be connected with the subterranean coolers and made to serve in the construction of these apparatus. Instead of condensing by the contact of the cold water from the subterranean coolers, the condensing liquid to be used in the ordinary mode of condensing distillates, vapours, and steam may be cooled by the flow from the subterranean coolers.

In lowering the temperature of the air in ships, the cooler temperature of the ocean, seas, lakes, is made available either alone or aided by compressing, cooling, and expanding the air, and by the cooling effect of evaporation. The air coolers or refrigerators may be in the form of tubes on the outside of the hull of the vessel, or in the keel, in order to come in contact with the water in which the vessel floats. The air may be forced through the coolers by the wind by steam power or by "the motion of the " vessel among the waves, or by the action of the waves against " the sides of the vessel. After the air has been cooled by passing " through the refrigeration apparatus," it is conducted "into the " part of the vessel to be cooled. When the air is required to be " dried as well as cooled, this may be accomplished" as already described. The space in the vessel for storing freight should be formed with air spaces around and through it, so as to afford the air free access. In carrying grain the moisture may be expelled by driving warm air through the channels. "The motion of the " vessel among the waves, or the action of the waves against the " vessel may be employed to force air by means of a bell" "fixed " on any part of the vessel with the bottom of the bell open and " dipping below the surface of the water, and valves" "opening " inwards above the water line." As the ship rises out of the water, air enters through the valves, and as the ship sinks this air is forced into the pipes by the rising of the water in the bell. A web or plate may be attached to the vessel to form a space between its sides and the web; this space may be divided into compartments. The space for catching and injecting the air into the vessel may be formed of plates conforming to the contour of the ship.

[Printed, 4*d*. No Drawings.]

A.D. 1865, March 23.—Nº 813.

SAUNDERS, Thomas Harvey.—"Improved means of ventila" tion by the use of perforated, tubular," or hollow "cornices " and centre pieces." The system is stated to be especially *applicable to bedrooms.*

Tubes in the form of cornices are applied in the angles of ceilings and walls of dwelling houses and other places. These cornices have perforations in front, or at those parts which are presented towards the interior of the room; but the backs, or those parts towards the ceiling and walls, are not to be perforated. In some instances no back will be necessary, as that may be formed by the wall to which they are applied; and in that case the front view of cornice will be all that is necessary, the same having return edges for securing to ceiling and wall.

For admitting air openings are made through the external wall in a line with or immediately below the ceiling. In ordinary apartments of dwelling houses one or two openings about the size of an ordinary brick will generally be sufficient. Two openings are preferably made, one in each angle of the external wall of the apartment, so that the side cornices are horizontal to and in direct communication with the openings. In order to equally distribute the air round the room the perforations in the cornices increase in size or number as the distances from the openings increase.

In apartments likely to be overcrowded another opening is made in the external wall, about midway between the former two. From this runs a single pipe inclosed by the ceiling, and terminating in or near to the centre of the ceiling, having an open end presented towards the interior of the room. This opening is screened by a perforated centre piece having perforations. When fixed the centre piece is to be one-third larger than the opening, "and to be fixed so as to project or be slightly "pendent from the surface of the ceiling, leaving a passage "between the two for the ingress and egress of air."

"In halls or places having large ceilings divided into panels, "each panel may be treated as a separate ceiling as previously "described."

"In applying this system to new buildings a channel may be "formed at the back of or immediately over where the cornice is "intended to be placed." In that case the cornice may be of the description now in use, but with perforations communicating with the said channel and interior of room. The perforations in or through the cornices are "in all instances to be equal to or "greater in the aggregate than the openings in the external wall "by which the air is admitted. The openings in the external "wall may be fitted on the exterior side with an ordinary air "brick or a perforated covering."

As an auxiliary means of ventilation, openings may be made through the external wall in a line with or slightly above the wall of the room, admitting air along a channel at the back of the skirting. The skirting has openings to admit the same at any convenient places where least observable.

[Printed, 6*d*. No Drawings.]

A.D. 1865, March 28.—N° 879.

KING, HENRY WELCHMAN.—(*Provisional protection only.*)—" Improvements in ventilating blinds." They consist " in con-" structing blinds of a series of segments of tubes pivoted at " top and bottom upon stationary rods, and connected near one " end to studs upon a movable bar. The segmental " " por-" tions of a tube are placed so close to each other that even " when in position to allow of the passage of the greatest amount " of air the blind cannot be seen through." The blind may be adjusted " by causing the plates to move on their pivots by " means of the movable bar."

[Printed, 4*d*. No Drawings.]

A.D. 1865, March 29.—N° 889. (* *)

HOLROYD, RICHARD, and BOLTON, JOSEPH HOLROYD.—This " invention is designed for the purpose of drying or dis-" pelling moisture from ' warps ' of cotton or other fibrous sub-" stances," and is " particularly applicable after such processes " as sizing or dyeing. The improvements consist in passing the " ' warps ' in their wet state over a series of rollers peculiarly " arranged in a chamber or room containing heated air."

" The improved arrangement of apparatus consists of a lofty " chamber," " near the top of which a double series or row of " rollers are mounted in brackets, bars, or bearings, one series " above the other, a similar arrangement of rollers being placed " at the lower part of the chamber. The rollers at the extreme " top and bottom of the chamber are of large diameter, and are " furnished with exterior ribs parallel to the axis of each, which " are tapered from the centre of the length towards the ends, over " which the warps pass; these rollers are driven by gearing. " The second series, which are vertically above and below the " large rollers being smooth on their surfaces and are simply " carriers for the warps." The warps are passed between one

" series of large top rollers and one series of small bottom rollers, " and between the opposite series of small top rollers and one " series of large bottom rollers, which gives great length of traverse " in a small space; the warp having passed about four times " around the rollers then passes out of the chamber in a dry state. " The air with which the chamber is supplied may be heated from " below by means of any suitable stove or heating apparatus, and " the chamber is ventilated and the moisture removed by two " down draughts taken from over the centre of the chamber, " which are connected with a chimney or up-draught outside the " chamber."

[Printed, 10*d*. Drawing.]

A.D. 1865, March 31.—N° 909.

LEAK, Elias.—(*Provisional protection only.*)—" Improved apparatus for collecting or receiving pulverized flint or dust " discharged into the atmosphere of a room during any process of manufacture. It consists of a fan mounted upon a shaft in a vertical case having a perforated top. The shaft is carried on bearings at each end, and is furnished with a pulley round which passes an endless band. As the fan revolves, the pulverized flint or dust is drawn in through the perforated top, and collected into the case. The fan case is placed against the outside wall of the room, and a vent hole is cut through the same by which the air drawn in by the fan with the dust escapes, and also such particles of flint or dust as do not remain in the box. When it is desirable that all the dust should be collected into the box, and only the air discharged, the vent hole may be covered with fine wire gauze.

[Printed, 4*d*. No Drawings.]

A.D. 1865, April 6.—N° 981.

JOHNSON, John Henry.—(*A communication from Herman Haupt.*)—" Improvements in machinery or apparatus for drilling " or boring rocks and other hard substances in tunnelling, " mining, and other like operations, parts of which improve- " ments are also applicable to the ventilating of the workings " in mines and similar places." The rock-boring machinery described is driven by steam power underground, and the ventilating process specified is arranged with the main object of getting rid of the smoke and exhaust steam from the boiler and engine respectively, while at the same time incidentally ventilating the works. Lengthwise of the tunnel where the drill is at work is a long pipe, connected with a rotatory fan. The open end of this vacuum pipe extends up to the face of the work, or to any other part it is desired to ventilate. It is either of metal or wood; "if of wood it is put together with "pieces like the staves of a barrel, the joints being coated with "pitch or other cement" to prevent leakage. The chimney of the steam boiler communicates with this vacuum pipe, and the current of air exhausted by the fan carries away the smoke and waste steam, and discharges them outside the tunnel at the same time that it produces a partial vacuum, and thereby ventilates the working. By means of branch pipes this action can be extended to any side galleries. The draught can be regulated by means of dampers in the pipe. "The pipe need not be placed on "the outside" of the tunnel, "but may be situate at any point "intermediate between the generators and the outer end." The fan would then be made to exhaust the fluids, and force them out at the outside end.

[Printed, 1s. Drawing.]

A.D. 1865, April 7.—N° 989. (* *)

WELCH, Edward.—"Improvements in fire-places and flues, "and apparatus connected thereto."

The back of a fire-place is divided "by a fire-clay partition;" the gases passing on both sides through an aperture left in the bottom. Between the chimney breast and the partition is a "lever "ventilator." "The back and cheeks of an ordinary brick fire-"place" are formed of fire-tiles with a flue behind the back and each cheek.

The ash pan under an ordinary range is set close under the fire, and the heat from the bottom grid, and from an open grid at the back, first flows into the ash pan, and thence under and around the oven. A register is attached to the ash-pan.

Ovens for kitchen-ranges are described.

"An improved apparatus for air flues" consists of a circular disc, with a space between it and the wall up which the foul air of the room passes into an air flue behind the disc. Behind this apparatus is a valve for preventing down draughts.

Brick "flues in floors for warming and drying purposes" "are "covered with an iron plate" "resting upon a wall plate of iron," "formed also to receive a second plate of trellised iron fixed over "the first."

A method of warming a bath is described.

[Printed, 8*d*. Drawing.]

A.D. 1865, April 7.—N° 995. (* *)

EDMONDS, Henry.—"Improvements in apparatus for lighting "and ventilating ships, part of which is also applicable for producing fresh water at sea." The improvements consist, first, in constructing a tubular apparatus to extend around or partly around the sides of the mess or cabin decks of a ship, at as high a level as it can conveniently be placed. The diameter of the tube should be from 3 to 6 inches, according to the number of lights required to be used in connexion with it, about one square inch for each lamp. The lamps should be stationary beneath this tubular apparatus, each fixed in its place and provided with a chimney. "I prefer to use a square lanthorn to fit over the "lamp, having a metal chimney, the lanthorn to be three sides "glazed and one side reflecting. Above each lamp a small branch "tube about 1¼ inch in diameter should lead downwards from "the side tube already described to near the level of the top of "the chimney of the lamp, and it should be provided with "a sliding continuation to fall and fit closely over it, thus establishing a direct communication between the lamp or lighting "medium and the side tube, into which all the heat and vapours "of the lamps must pass; to carry these off the side tube or "tubes must be communicated into one or more updraft ventilators; these may be any of the ordinary ventilators at present "in use, as the funnel, hollow iron masts, the galley funnel, or "tube ventilators.

"Second, where tube ventilators are used to create the necessary "constant updraft, and to increase their ventilating action on the "between-decks, I insert a steam condensing vessel supplied by "a pipe with steam from a boiler into the lower part of the ventilator, having tubular or other air passage passing through it "occupying the greater part of its area. The steam surrounds "these air passages, and the air being thus heated and rarefied "rises rapidly and a constant up-current is created, and a larger

" quantity of the foul air of the decks will also be drawn through " these air passages in the" condenser; this, together with the vapours of the lamps, will, by abstracting heat from the steam, condense it into fresh water, which flows out through a pipe at the bottom of the condenser.

"Third, the motion of the air through the heated air passages " for ventilation and for the increased condensation of steam may " be accelerated by the use of a fan or other air forcing means, " such as by directing a number of minute steam jets up the " ventilator, which I find the most effectual when acting above " the condenser.

" Fourth, for lighting in connection with my apparatus any " kind of lamp or lighting medium may be used, but I prefer to " use a hydrocarbon lamp, such as Hinks' Patent."

[Printed, 8*d*. Drawing.]

A.D. 1865, May 29.--N° 1471. (* *)

MYERS, Edward, and STODART, James.—" Improvements " in the means and apparatus employed for preventing down- " ward draught in chimnies, facilitating the escape of smoke " therefrom, and for ventilating apartments or buildings." A cowl is made with a revolving cap, on which is a wide-mouthed funnel, adjusted to the wind by means of its action on a vane on the opposite side. Another kind of top is formed with spiral grooves outside, above which is a cowl fitted round the outlet. The interior of this cowl can also be made with spiral channels.

[Printed, 8*d*. Drawing.]

A.D. 1865, June 13.—N° 1598.

BODMER, John James.—" Improvements in the method of " constructing partitions, walls, floors, and roofs of buildings." For these uses, hollow or tubular blocks may be adapted, the cavities being either filled or "left empty or open to ensure " greater lightness, and afford means of ventilation."

The blocks are to be moulded out of any of the known compositions for artificial stone, or of cement, or lime, or plaster; but when in any way exposed to moisture, they are to be made of "a " mixture of hydraulic lime and blast furnace cinders."

Such blocks, alone or in combination with lamellar ribs," or a framing of wood or iron, are to be used in constructing partitions or walls.

In the construction of floors they are combined with a lamellar framing of beams of wood or iron, upon which the "blocks "would be set in an arched form from wall to wall."

A similar plan is to adopted for roofs; the principals or rafters being framed in combination with these blocks.

[Printed, 4*d*. No Drawings.]

A.D. 1865, June 19.—N° 1648.

CLAY, William.—"Improvements in ventilating railway carriages, and in the apparatus to be employed therefor."

In order to exclude the dust from, and provide fresh air to, railway carriages in motion, the air is conducted through pipes into a box containing water, into which the pipes dip. The air thus washed is conveyed through another pipe to a ventilator placed on any part of the carriage, and provided with regulating valves; or the ventilator may be placed on the side of the vessel itself. Instead of employing a volume of water, the vessel may be filled with sponge or wool kept moist; or the air may be caused to pass through woollen or cotton cloths kept damp by causing their lower parts to dip in water. This vessel has cocks or valves for emptying and supplying the water.

Several modes of conducting the air into the apparatus are shewn. To either end of the supply pipe is adapted a trumpet mouth, for collecting the air as the carriage travels onwards in either direction.

Or an exhausting fan, rotating in a box connected with the supply pipe or the exhausting vessel, and driven by a band from a pulley on the carriage axle, may be employed. The washing box and fan may also be placed beneath the carriage.

Or a vane wheel, with vanes of various shapes, may be fitted on the shaft of the fan, and on being driven by air passing through the trumpet-mouths of the apparatus, on the carriage being set in motion, will propel the exhausting fan.

This fan, instead being made to exhaust, may also be made to blow, the air through the filtering media.

[*Printed*, 1*s*. 2*d*. Drawings.]

A.D. 1865, July 3.—N° 1755. (* *)

DEANE, Edward.—(*Provisional protection only.*)—"Improve-
"ments in tubular structures, rendering them specially applicable
"for ships' masts and building purposes." The invention consists in constructing tubular structures in such manner as to render them useful for the purposes of masts of ships and vessels, lighthouses, towers of observation, shafts for ventilation, passages for smoke, hoist shafts, and other purposes. The construction is thus described by the inventor:—"I form a tube, in the centre of
"which I have an upright rod or core, which becomes the axis
"from which a radiating stay or radiating stays proceed;" "and
"this core instead of being a rod or solid standard might itself be
"a tube, and instead of a core or rod, I could, if thought desirable,
"have a number of smaller upright tubes within the outer up-
"right tube; and this arrangement could be combined with the
"core and stay or stays before mentioned." The mode preferred is as follows:—"I have three upright stay plates (or I have a
"number of boiler plates fastened together so as to form in effect
"one plate, and use three plates thus constituted or constructed).
"One of these three upright plates occupies the whole diameter
"of the tube, and projects slightly beyond it for the purpose
"herein-after described. The other two upright plates make each
"a semi-diameter, and are secured to the first-named plate at right
"angles; all these plates being fastened together by angle plates
"and bolts or rivets, by which means a strong centre or core
"is secured. The outer part of the tube is composed of four
"segmental pieces, which have flanges, having the projecting
"parts of the upright stay plates tightly secured between them
"by means of bolts or rivets through all of them." "Instead
"of three stay plates, four, five, seven, or other convenient number
"might be adopted."

When the invention is adopted in ships of war it will be desirable to have inside the tubular structure, step pieces so that men may mount up inside; and also to provide loop-holes for the use of sharpshooters or otherwise.

[Printed, 4*d*. No Drawings.]

A.D. 1865, July 18.—N° 1866. (* *)

LE PATOUREL, John Paul Baugh.—"Improvements in
"ventilators." The improvements consist, first, in having a

ventilator fitted with "a chamber, stop and throttle valve, feed "and waste pipes, and so formed as to fit closely on to the inside "of the ship, securely covering the side scuttle or porthole; the "fresh air entering through the scuttle or porthole passes into "the ventilator, through the chamber of which it passes into the "feed pipe, and thence into the ship. This ventilator being fitted "with self-acting throttle and stop valve, any water entering "through the scuttle is met by the stop valve, which is fitted to "lift with the water, the stop valve rising throttles the feed pipe, "preventing the ingress of water, while at the same time it (the "stop valve) opens the waste pipe and admits of the water running to waste," or the waste pipe and stop valve may be dispensed with.

Secondly, in having a double tubular ventilator, with a space between the tubes fitted with a cowl head. At the bottom of the outer tube, a flange is formed, which bends under the inner tube, and extends in towards the centre of the inner tube six or more inches, forming a receiver, which receiver is fitted with a small self-acting stop valve and waste pipe. The centre of the receiver, which curves up, is covered with a valve or scuttle, worked by a rod direct to the top of the cowl head. A clear space is left under the lower part of the inner tube. The outer tube at certain distances from the bottom is fitted with glands to admit of the foul air entering the uptake, which is formed between the two tubes, while feed pipes, fitted in certain parts of the ventilator, admit air when required. By this improvement, fresh air enters by the cowl head, which is fitted to turn to the wind in the usual way, is forced down to the receiver, in which it recurves into the uptake, and continues its course through, carrying with it the foul air admitted through the glands, acting the part of a syphon at the same time that it supplies fresh air where required. Any water entering through the cowl head is received into the receiver at the bottom of the ventilator, and let-off through the waste pipe.

Thirdly, in having a cowl-head ventilator standing on a case made for the purpose, and fitted with a collar, around which the cowl head turns in the usual way. In this case, the self-acting valve is fitted to lift with the water, throttling the feed pipe through which the air has to pass, at the same time it (the valve) opens the waste pipe, and admits of the water running off, the air entering the head of the ventilator, descends to the chamber (formed inside the case), thence through the feed pipe (or aperture) into the ship, or where required. Any water entering through the cowl head is caught in the receiver (or reservoir); thence, coming in contact with the self-acting valve, it raises it, and admits of the water running off, while a larger quantity of water rushing down the ventilator, raises the valve and throttles the feed pipe, preventing the ingress of water, while a little water remaining in the receiver will have the effect of cooling the air.

[Printed, 1*s.* 6*d.* Drawings.]

A.D. 1865, July 28.—N° 1953.

LAROCHE, Leon Paul.—(*Provisional protection not allowed.*) —" Improvements in fire engines and hydraulic machines." Their leading notion consists in providing the faces of the pistons of such machines with thin plates, " shaped like the blades of " sharp-edged and polished razors," or with " conic-pointed " needles."

The inside of " a blowpipe, or a pair of bellows of a forge," is also represented as being thus provided. The plan is also stated to be applicable to " concentrated ventilators;" but it is difficult to guess at the process of reasoning whereby the intending patentee arrived at the conclusion that his construction would yield " a profit of forty per cent. in outlay."

[Printed, 6*d.* Drawing.]

A.D. 1865, August 14.—N° 2102.

GAMGEE, John.—" Improvements in the construction of cow- " houses."

Cows are housed in buildings separated from each other by roads, forming the means of entrance to one lot of sheds only, and uniting into a central yard where the food is stored. Each such house is itself divided into compartments for not more than twenty cows, each compartment being isolated by impermeable walls, painted or lined, or of glazed or vitrified bricks, accessible by a single double-folding door. Ventilation is provided for in the roof, distinct for each compartment. A ridge and valley roof is constructed near each lot of compartments; and openings for the admission of air are made near the apex of each ridge and over the centre of each compartment. The mangers and the gutter behind the cows are made to incline towards the road, beneath which the drain passes.

[Printed, 1s. Drawings.]

A.D. 1865, August 16.—N° 2111.

BILLINGS, James.—"Improvements in ventilators."

Two plates are so set in a frame that the lower one of them is in a line further back than the other. A third plate, movable on a centre, is fitted in the frame in the space between the two others, and with its ends extending beyond each of the two fixed plates. To allow the passage of a current of air, the third plate stands midway between the two others; to shut it off, the plate is turned round on its centre, thus bringing its ends towards the two outer plates. Its movements can either be limited by means of recesses in the frame, or by studs fitted on the outer plates.

Or the central plate can be fixed, and the two outer ones made movable, on joints, and adjustable against the central plate.

Or all the three plates can be fixed; flaps being applied both at the top of the central plate, and the top of the lower plate, or elsewhere.

[Printed, 6d. Drawing.]

A.D. 1865, August 19.—N° 2148.

MARSH, John Edwin.—(*Provisional protection only.*)—"Im-" "provements in punkahs." Their leading feature consists in constructing an apparatus on the plan of a pocket watch, with spring and fusee of a large size. On the spring being wound up it communicates its motion through a train of wheels to a cranked arm, by which the punkah fan is oscillated to and fro.

[Printed, 8d. Drawing.]

A.D. 1865, September 26.—N° 2467. (* *)

HILLIAR, John.—(*Provisional protection only.*)—"Improve-" "ments in apparatus for ventilating and for preventing down" "draught in flues." The flue is made tapering towards the top and surrounded by a casing. A valve is used consisting of two flaps hinged in the centre and balanced by weights. In the case of a ventilating shaft, gas burners inside it may be employed *to increase* the draught. A short cylinder is placed at the top and a cap may also be set inside it. The scissors-like valves, opening against the external air, may also be fitted at top in lieu of the cap; or these valves, made of a larger size, can be employed to form two of the sides of the cowl. Another shape may be made with two concentric shafts, having vertical flaps at right angles to those of the other, and with openings in the outer jacket.

This "improved cowl or ventilator" is "applicable to the roofs "of buildings for the purpose of carrying off the vitiated air."

[Printed, 6*d*. Drawing.]

A.D. 1865, October 10.—Nº 2603.

COOKE, WILLIAM.—(*Provisional protection only.*)—"Improve- "ments in window fittings." These fittings consist of laminæ or pieces of wire gauze or other perforated material so constructed as to represent blinds, cornices, or ventilators. The wire gauze is stretched upon frames of metal or wood, in strips or folds; each blind, cornice, or ventilator consists of two pieces or more so formed as to expand or contract at pleasure, and thus fit various sized windows or openings. By hingeing together any number of these ventilating blinds they can be made to fill up any space left open by a window partially or entirely open, and they can also be made to open and shut at pleasure.

[Printed, 4*d*. No Drawings.]

A.D. 1865, October 10.—Nº 2609. (* *)

WOODWARD, JOHN GARRISON.—"An improved ventilating "apparatus for use in steamboats, vessels, and other places "requiring to be ventilated." The invention consists in a ventilating casing surrounding or contiguous to the smoke pipe or funnel, through which air is drawn from the engine and fire-rooms by the column of air ascending which is warmed by the smoke pipe. This current of air, taken from the engine room, conveys away any noxious gases, dust, vapours, and also the heated air, and in place thereof the cool air will descend by a natural action through the hatchways, and this system of ventilation may be extended by pipes to the other portions of the vessel. The said ventilating case is also carried up above the top end of the smoke stack or funnel of the boilers, in order that the ascending ventilating current of air may increase the draft of air passing through the furnace.

A partition or hood extending down near the front of the furnace to a short distance above the fire-doors, serves to direct the circulating current of air in such a manner as to convey away all dust and vapours, and prevent the heat from coming into the engine-room.

There is also a casing made in sections so that it can be removed, surrounding the boiler, leaving an air space between itself and the boiler, the object of which is to retain heat and prevent the ventilating current of air cooling the boiler too much. This casing is to be retained in place by hoops running around the boiler, the metallic plates running lengthwise of said boiler, and, if preferred, openings may be left in the casing so that a small circulation of air may be allowed, to prevent the air becoming too much heated within the casing.

[Printed, 8*d*. Drawing.]

A.D. 1865, October 18.—N° 2684.

DENNIS, Thomas Hungate Preston.—(*Provisional protection only.*)—" Improvements in greenhouses."

Iron eyes are attached on slates to the wall against which the greenhouse has to be placed, and somewhat below the ridge line The fixing plate is then fitted up close to the wall, and wedges are passed into the eyes. The rafters and end plates can then be attached to such ridge in the usual manner. When the ridge can be brought to the top of the back wall, a cramp is made to lay upon the top with one end turned down over the side of the back wall, the other end to run past and overhang the upright line of the back wall. In this overhanging part a long hole is made, and an angle piece is fixed upon the top of such cramp at right angles with it and flush with the upright line of the wall. Against these angles the ridge plate rests. The cramps are laid upon the back wall at varying distances, and when so laid the ridge plate is fitted up close to the wall with part of its depth standing above the top of the wall. Wedges are then passed through the long holes of the cramps. The rafters and other parts can then be attached to the ridge.

The fittings consist of metal fastenings to support and retain the sashes, "and front mullions to support eavesplate." The *ventilators* in the front and at the apex of the roof are connected *by rope or* wire passing over pulleys, and thence to a long rod actuated by a rack and wheel, and thereby opening or shutting the ventilators simultaneously.

Or at the lower part of greenhouses the front dwarf brick wall may be built a suitable distance back from the front plate and running out piers at intervals are made to support the front plate, thus forming a space between it and the wall which, being covered by a hinged or sliding shutter, forms the ventilator.

The glazing is done with thin layers of india-rubber covering entirely the rabbit of the sash bar. The glass, being pressed on to its bed by metal cappings, is there secured by pins and springs.

[Printed, *4d*. No Drawings.]

A.D. 1865, October 31.—N° 2799.

WHITE, David Blair.—(*Provisional protection only.*)—" Im-" provements in ventilators for windows and other like openings." They consist in constructing ventilators of an open fabric, " one " end of which is secured to a spring roller, while the other " " is fastened to the window sash. On opening the sash the " ventilator follows it if already fastened to it; or the ventilator " may be pulled down or up " " to occupy the space between the " sash and window frame, and be fastened to the sash. " The " position of the spring roller may be reversed, that is to say, it " may be fitted to the sash."

[Printed, *4d*. No Drawings.]

A.D. 1865, November 17.—N° 2953.

HUNTLY, Samuel Hazard.—" Improvements in apparatus " for obtaining fresh water from salt and impure water, also " applicable for ventilating purposes."

The steam, after leaving the boiler of the distilling apparatus is conducted through pipes, the outer surfaces of which are cooled by currents of atmospheric air. These pipes are so arranged as to afford a considerable surface for the air to act upon.

By placing them in passages communicating with the interior of the ship, the heat imparted to the air causes an upward current, whereby ventilation of the interior of the ship is effected. An arrangement for this purpose consists in making the condensing apparatus of an annular form, and in placing it " in a " surrounding tube open at top and communicating at bottom

" with the interior of the ship," " and so arranged that the air " from the latter would pass up through the inner space of the " annular receptacle, whilst the external air passes into the ship " " through the space between the external surface of the annular " receptacle and the surrounding tube." The lower end is provided with valves, by which " the communication between the " interior of the ship and the apparatus may be cut off, and the " air that enters into the space between the condensing apparatus " and the tube, after passing down in such space, be made to " pass up again through the central space of the apparatus."

The drawing shews an apparatus consisting of a number of concentric annular closed vessels communicating at top by means of a pipe with the boiler. It is surrounded by a casing, the upward termination of which is formed into a trumpet-mouthed opening; and this is again surrounded by another casing, with another trumpet mouth. Both these mouths are movable, so that one can be turned to, and the other from, the wind. The two casings are fixed in the roof of the cabin to be ventilated, and with which the interior of the casing can be made to communicate by adjusting a valve at the bottom of the casing. This valve has fixed and movable apertures at its centre by which the interior of the casing can be made to communicate or be shut off from the cabin; it has apertures at its periphery by which the interior of the inner casing can communicate with or be shut off from the outer casing; and the valve has also apertures in the annular space between the inner and the outer casing. These apertures are so arranged that while those at the centre and those at the annular space between the two casings are open, the apertures at the periphery through which the two casings can intercommunicate, are closed, and vice versâ.

The condensed water can be conducted to storing tanks and on its way thither may be further cooled by being conducted through pipes placed below the surface of the sea.

[Printed, 6*d*. Drawing.]

A.D. 1865, December 8.—Nº 3153.

DE MONDÉSIR, PIARRON, **LEHAITRE**, PAUL, and **JULLIENNE**, AUGUSTIN.—" An improved mode of applying the " compression of air for ventilating purpose, and the compression " *of any gas* for hurrying along elastic fluids in conveying pipes." *It is applicable* to the ventilation " of hospitals, barracks, theatres,

" exhibitions, dancing and music halls," churches or dormitories, " of mining galleries, tunnels in course of perforation," " and to " unhealthy works of all kinds; of ships, either to supply the " hold between decks or cabins with air, or to rapidly carry off " the smoke of powder from the batteries of men-of-war;" and " of cesspools, sewer pits, or waterclosets provided with ventilating pipes," as also "for increasing the draught of chimneys " or fire-places," and generally to ventilation of places where many people are assembled, or for "expelling smoke, dust, or any " unhealthy gas from similar places." The plan can also be used for increasing the draught of chimneys and the blast of blowing machines, and also "for hurrying along lighting gas."

A small jet of air forced out in a jet from the nozzle of a pipe is directed into a much larger pipe opening at one end into the open air, and at the other into the place to be ventilated.

Or the exhaust end of the large pipe may communicate with the place to be ventilated by reversing the direction of the air jet pipe.

As the compressed air expands it cools down the air it conveys along with it, and this "effect may be increased" by "lessening " the diameter of the suction pipe."

The air jet pipe is shewn in the drawings as opening into two T-pipes and two horizontal pipes, and in each case communicating with a reservoir of compressed air or gas. In one case a jet is directed down the vertical stem of the T-pipe, thus inducing currents from the two side branches; with the second T-pipe, opposite currents are propelled along both the horizontal branches by means of two horizontal jet pipes opening in opposite directions and inducing a flow of air up the vertical stem.

[Printed, 8*d*. Drawing.]

A.D. 1865, December 20.—N° 3287. (* *)

HARRISON, Joseph John, and HARRISON, Edward.—(*Provisional protection only.*)—" An improved mode of and apparatus for purifying and deodorising impure air, whether in " buildings, ships, mines, or sewers, which improvement is also " applicable for ventilating purposes." The improvement consists of a chamber, receptacle, or box having any desired form or configuration, and so arranged that portions of carbon, charcoal, or other disinfectant may be contained within it upon open shelves through which air can freely pass; or the bottom of the said chamber supporting the disinfectant must be perforated, and so constructed that air may have a free passage through such perforations into and amongst the carbon, charcoal, or other disinfectant placed therein. The circulation of the air may be effected as follows:—Upon the top of the said chamber or box, a little above the disinfectant, a lamp is placed, which, when burning, heats or rarifies the air in the immediate neighbourhood, and has the effect of creating a draught or current through the chamber, thereby purifying the air by its contact with such charcoal, and rendering it thoroughly wholesome. The requisite current of air may also be created by the employment of a fan, air-pump, or other equivalent placed in the same position as the lamp before mentioned, and driven by means of a coiled spring or other mechanical equivalent.

[Printed, 4*d*. No Drawings.]

A.D. 1865, December 20.—N° 3292.

CLARK, WILLIAM.—(*A communication from Azel Storrs Lyman.*) —" A new and improved apparatus for cooling and purifying air " in rooms or compartments and ventilating the same." It consists of a tall casing containing trays holding lime and charcoal past and through which, respectively, the air is made to pass, after which it is cooled before being delivered for respiration. The apparatus is shewn as applied to an invalid's bed; and it is also stated to be applicable as a " refrigerator."

The tall casing is separated into two parts, nearly equal in size, by a horizontal partition, below which is a tier of trays containing lime, the uppermost of the tier being perforated for holding charcoal. From this bottom part a conduit ascends to the uppermost part of the whole box, and is continued across it, to a side opening, below which is a grating for receiving a piece of ice, the drip-water dropping into a pan placed above a pail. The air to be treated is admitted by an aperture below the trays to pass zigzag wise over the surface of the lime they contain, thence through the charcoal in the uppermost tray, and at last up the side conduit, where it comes in contact with a plate which, covering the top of the box, may be corrugated to obtain more cooling surface from the outer air; or may also be fitted with tubes or flat plates for guiding a current of water in a contrary direction to that of the air. The air thence descends through a side opening into *the ice chamber,* and at last down out of the delivery pipe.

"When using the apparatus as a refrigerator, the cold damp " air may be discharged from the refrigerator upward on one side " of their partitions, or the other side of which the air that has " been dried and warmed is received in a contrary current."

As applied to the bed of an invalid, it is made to serve as the bed's head, the air outlet being set somewhat above the patient's head. The bedstead itself has sides extending above the recumbent patient, and cut away at the centre, the open space being covered by curtains, and the space at the top open. The air outlet may be fitted with a perforated plate or wire gauze screen.

[Printed, 1*s.* 8*d.* Drawings.]

A.D. 1865, December 22.—N° 3314. (* *)

DEANE, Edward.—"Improvements in pipes, tubular columns, " and hollow structures for masts, bars, shear legs, life boats, and " ordinary boats for water, gas, and waste water pipes, and for " other similar constructions where great strength is required."

One part of this invention relates to the construction of "ventilating tubes." A tube is in the first place constructed, "which " may be round, square, oval, or of any other shape to suit the " purpose for which it is intended, of sheet iron or of any other " suitable metal as may be determined, having a web or webs of " similar material in its interior. These are bolted or rivetted in " the usual way to each other, and to the external tube, either in " the inside of the tube or to flanges on the outside. There may " be any number of webs, but two, three, or four will be generally " found to be sufficient," or a "tubular or solid core" may be used, " which becomes the axis from which radiating stays may proceed, " the said stays being securely fastened to the external tube."

If found desirable a number of such cores and radiating stays may be used.

In the formation of oars, masts, and boats, and other "particular " constructions," the metal core may be encased in wood, which can very readily be done by known processes, and will "add very " greatly to the lightness and strength of such constructions."

Several applications of the invention are described by reference to a sheet of Drawings annexed to the Specification.

[Printed, 10*d.* Drawing.]

1866.

A.D. 1866, January 19.—N° 174.

BENNETT, Alfred.—"A new or improved instrument or "apparatus for giving motion to hand and other fans." The fan is oscillated or also reciprocated by means of a spring and clockwork.

The apparatus consists of a circular case on a stand; and on the axis of the case is a horizontal spindle carrying a toothed wheel, to which rotation is given by a coiled spring similar to the main springs of clocks and roasting jacks. The toothed wheel gears with a pin on a similar spindle parallel to, and below, the first. On this lower spindle is a wheel which gears with a pinon working on the front end of the spindle carrying the first wheel. Connected with and in front of the hollow pinon working on the end of the main spindle is a balance wheel. The rotation of the wheel is converted into an alternating rising and falling motion by means of a lever crossing it and jointed to one end of the framing within the outer case. This lever has a longitudinal slot in which works a stud on the balance wheel. The free end of the lever is bent at right angles to the other part, and the extreme bent end passes through a slot in the edge of the case. The end of the lever projecting through the case carries a small clamp and screw for fixing the open fan to the instrument. The lever carrying the fan is pressed upwards by a spring which, when the fan is fixed to the instrument nearly counterbalances its weight. When the fan is removed the spring presses the lever upwards and the instrument remains at rest. On the fan being fixed in the clamp its weight presses down the lever and starts the instrument. The motion of the balance wheel through which the lever is worked may be arrested by means of a screw-stop made to bear against its face. The main spring of the iustrument is wound up by a winch taken by a fusee outside the back of the case.

The conversion of the rotatory motion of the main wheel into a rising and falling motion may also be effected in other ways, The spring may thus be made to actuate a spindle carrying on its top a horizontal wheel cut with inclined teeth, and driving a verge fitted with a pair of pallets, and connected to an arm on which the fan may be clamped. The alternate rising and falling of the pallets may be employed to move the fan either in a vertical or horizontal plane.

The drawings also illustrate modifications by which an oscillating motion is given to the fan by a cam or eccentric; and by which a rising and falling motion is effected by an eccentric and also by a crank.

[Printed, 1*s*. Drawings.]

A.D. 1866, February 23.—N° 557.

PARKER, JAMES.—(*Provisional protection only.*)—" Improve-" ments in engines and apparatus for obtaining motive power " and for using the foul air in mines as fuel."

It relates to improvements on the Invention embodied in Specification No. 2620, A.D. 1863. Atmospheric air and steam are used in combination as motive power in any ordinary low pressure condensing steam engine. A condenser is employed having a partial vacuum into which are discharged the exhaust steam and air or moist air from the cylinder. The steam or moisture in the air thereby condenses, and the air previously in combination with the steam cools and contracts, and is then drawn off from the condenser by steam jets and nozzles similar to those used to drive in the atmospheric air. The air drawn out of the condenser may be used to blow up the fire or to increase the draught thereto by discharging it up the funnels. The length of all air nozzles is increased beyond the size given in Specification No. 2620, A.D. 1863; and they are placed closer to the jet apertures. A larger number of very small jets and nozzles are used instead of a smaller number of larger jets and nozzles. Instead of using the steam and air pressure and the atmospheric or vacuum pressure together to give motive power, either may be used separately for the purpose.

The vacuum pressure obtained is applied as a means of giving motive power to engines where the pressure of steam, hot or compressed air, or gas may be objectionable; or " where it may be " desirable to use a cold motive power or a motive power not " liable to loss by condensation. The boiler and jets and nozzles " may be placed at a distance of even several miles from the " vacuum engine;" " and therefore will be of service for mining " purposes, and also because the foul air or gas in the mine will " thereby be drawn from the mine and be replaced by a constant " stream of fresh atmospheric air flowing into the mine to restore

" the equilibrium of pressure. The foul air or gas drawn from " the mine if inflamable will be discharged into the fire of the " boiler outside the mine, where it will be used as fuel to generate " steam." In some cases " the discharged inflamable gas will " probably supply the greater part of the heat necessary for " working all the engines of the mine; both inside and outside " the mine."

[Printed, 4*d*. No Drawings.]

A.D. 1866, March 19.—Nº 814.

CROLL, Alexander Angus.—" Improvements in arranging " conduits or channels for the reception of gas, water, and other " mains, tubes, or pipes, and telegraphic wires, also for the con-" veying away of smoke or noxious vapours from buildings, and " for the ventilation of buildings and other places."

Conduits of metal are carried on columns above the surface of the road, or "under the footway." They have covers made in sections connected by dovetail or socket joints, so as to be removable; outlets are to be provided; and the whole is supported in either a double or a single row of columns; in the first case serving as a covered footway, and to facilitate crossing the street by foot passengers. The sides of the conduits are to be provided with shelves for plants or flowers, or may be used for advertizing. Subsidiary mains " from the elevated conduits are " applied in channels under the pavement or along the fronts of " buildings and supplied at intervals from the general mains."

The primary object of these elevated conduits is the reception of gas and water mains, pneumatic despatch tubes and telegraph wires; but the supporting columns, made hollow, are to serve as channels for conducting off smoke and vapours from buildings, fans being used to draw or force the vapours through the columns and the channels connecting them with the buildings. The drawings shew several arrangements, somewhat differing in details, but a more definite application as a means of ventilation is not specified.

[Printed, 2*s*. 10*d*. Drawings.]

A.D. 1866, April 27.—Nº 1182.

***HOLDEN*, Edward.**—(*Provisional protection only.*)—" Improve-" ments in apparatus for effecting the ventilation of rooms and

" other places." To their upper parts, communicating with the external atmosphere, are applied concentric tubes placed vertically one within the other. The area of the inner tube is greater than the area of the annular space left between that inner tube and the outer one. Their shape may be varied. " Passages from " different rooms may be conducted to the inner " of these tubes " in order " to obtain outward currents " from such places.

[Printed, 4*d*. No Drawings.]

A.D. 1866, April 27.—N° 1190.

WHITE, David Blair.—" Improvements in ventilators for " windows and other like openings."

They are made of an open fabric, one end of which is secured to a spring roller, and the other to the window sash. On opening the sash, the ventilator follows it if fastened to it; or it may be pulled either down or up, to occupy the space between the sash and window frame, and be fastened to the sash. When the ventilator is not required it winds upon the spring roller. The position of the spring roller may also be reversed.

The open fabric may be fixed to the upper part of the inner beading of a window frame, so that it lies in the interstice between the inner beading and the upper sash when this sash is closed. When the upper sash is lowered, the ventilator covers the opening. The open fabric may be in either one or two thicknesses. When the latter are used, the space between the tops is enclosed.

Or ventilators may be made of a frame of open fabric laid against the window, so as to cover its opening. To the lower part of this frame is hinged another of open fabric. This second frame lies at any angle in order to direct cold air up towards the ceiling; it may be removed if required. Between the two frames are fitted two side cheeks, not of open fabric, and the space contained within the upper edges of the frames and cheeks is covered with gauze.

The frames in the ventilators are made of two thicknesses of gauze.

To prevent the entrance of air or dust between the joints a strip of india-rubber is fitted across the bottom of the upper sash or the top of the lower sash, and a similar strip to the ventilator.

The open fabric may be ornamented.

To prevent the upper sash being lowered, or the lower raised beyond a certain extent, catches are fixed to the frames. The drawings shew a screw bolt fitted to the upper sash for this purpose.

[Printed, 8*d*. Drawing.]

A.D. 1866, May 2.—N° 1252.

URQUHART, David.—" Improvements in the construction of " furnaces or fire-places for economizing the fuel employed for " warming, heating, and ventilating buildings." A peculiar form of stove is used, and fresh air is supplied to the space it warms from an opening at the top or near the ceiling.

The furnace or stove is constructed partly in masonry and partly of iron, and its fire-place is sunk below the level of the floor. The upper part of the furnace is enclosed by a dome-shaped radiating plate of sheet iron or steel. The fuel is fed in from behind through a tubular opening in the back wall closed by a sand joint and cover. The air passes from the lower part of the room through a grating into the ash-pit, and from thence up between the fire-bars to the fuel. The fire gases pass off from one end of the furnace and thence along flues. At the opposite end of the furnace is a door for access to its interior. Above the dome-shaped radiating plate may be placed another plate in an inverted position. The stove or furnace may also be made with radiating plates front and back.

Ventilation is to be provided " by causing the air to descend " from above and pass to the fire by the interior suction of the " furnace, and by closing all other apertures and making the " doors of the apartment open outside. The window and doors " are made as air-tight as possible, and the air is admitted at the " top or near the ceiling of the apartment through " valves.

[Printed, 10*d*. Drawing.]

A.D. 1866, May 15.—N° 1384.

HASELTINE, George.—(*A communication from Henry Albert Gouge.*)—" Improvements in the mode of and means for pro" moting ventilation." The general feature in the apparatus here described consists in utilizing the exhaust action of a gas flame enclosed in a tube.

Apartments are ventilated by a gas burner enclosed either in a pipe extending from the floor, within or without the room, and opening into a chimney or flue. Below the burner is a sort of funnel, for diffusing the upward current of air. Towards the bottom of the pipe is a register; and two others at different levels above the gas flame.

"Magazines, bank vaults, refrigerators, state rooms of passenger "vessels, and the compartments of railway carriages," are ventilated by means of a gas light contained in a small external case. The hot gases pass up a metal flue; enclosed in another tube, which, at some distance above the flame, communicates by an aperture with the space to be ventilated. A small cone is placed in the flue above the flame.

Shop windows are ventilated by an apparatus similar in principle. A casing in front of the window contains a reflector placed above an ordinary gas light, made with sides continued up to the top of the casing, and with side openings covered by slides for the admission of air. A little above these openings is another small gas jet, the flame of which leads into a vertical pipe above. At the centre of the bottom of the casing is an opening regulated by a register, for the inlet of cold air; and beneath the bottom of the window sill is another opening covered by a slide. An inclined plate extends from the bottom of the window sill towards and close to the front window glass.

[Printed, 10*d*. Drawing.]

A.D. 1866, May 17.—Nº 1399.

DENNIS, THOMAS HUNGATE PRESTON. — "Improvements "in greenhouses, and specially relating to the fixings, fittings, "ventilation, and shading of the same."

Metal eyes on plates are attached to the wall against which the greenhouse is to be placed, and below the ridge line. The ridge plate is then fitted up close to the wall, having mortices in it to allow the eyes to project through. Wedges are passed into these eyes, which secure the ridge plate to the wall. The rafters and end studs can then be attached to the ridge plate, and the whole may be removed by withdrawing these ridges. Or when the ridge can be brought to the top of the back wall, a metal cramp "is "made to lie upon the top, and with one end turned down over "the side of the back wall, the other end to run past and over-"hang the upright line of the back wall on the side against which "the greenhouse is to be fixed." In this projecting part a long hole will be made, and a knee piece be fixed upon the top of the cramp at right angles with it, and flush with the upright line of the wall; or this knee "piece may be formed out of the solid by " punching the hole on three sides only, and turning the piece " thus punched backwards and upwards until flush with the " upright line of the wall." It is against these knees that the ridge plate rests. These cramps will then be laid upon the back wall at varying distances, and the ridge plate is then fitted up close to the wall with part of its depth standing above its top. Wedges are then passed through the long holes of the cramps which secure the ridge plate to the back wall. The fittings consist of metal fastenings to support the sashes in their place, and also front mullions to support the eaves plate.

The ventilators on the front and at the apex of the roof are connected by a rope, or wire, or chain passing over pullies, and thence to a connecting rod, which is actuated by a rack and wheel, and opens or shuts the ventilators simultaneously.

"A second plan of ventilation may be arranged at the lower " part of greenhouses, by building the front dwarf brick wall" a certain "distance back from the front plate, and running out " pieces at intervals "." to support the front plate, thus forming a " space between the front plate and the wall, which, being covered " by a hinged or sliding shutter, forms the ventilator."

"A third system of ventilation may be carried out by having a " given width of the gable end of the greenhouse directly under the " end rafter, and a part or the whole of its entire length made to " open inwards, outwards, or to slide," so that the aperture thus formed may direct the current of air directly under the roof. The same arrangement is to "be repeated at each end of the building, " and it may be continued of any suitable width from the lower " part of the end rafter to the ground line, or any part of such " distance. In buildings of great lengths," there are to be additional openings in the roof from the ridge to the eaves, which may be extended down to the ground line. "In case of " divisions being fixed in the building the same system will be " carried out, but the ventilators will be double, or so arranged " that a current of air can be directed through one compartment " only, or made to traverse any number of compartments; these " ventilators may also be made to slide or lift."

The improvements as to shading consist in the arrangement of certain pullies and grooved or flanged travelling wheels, ratchets, and pauls, so as to prevent the usual irregularity in the rolling up or down of blinds upon an inclined surface from the inequality in diameter between the blind and its roller or end at the various stages of its course up or down a roof, or from its increased or diminished bulk when wet or dry.

[Printed, 4*d*. No Drawings.]

A.D. 1866, July 6.—N° 1788.

AYDON, ENOCH HARRISON, and FIELD, EDWARD.—"Im-" provements in drawing or exhausting and forcing fluids, and in "instruments or apparatus applicable to such purposes." These consist in a number of applications of steam induced currents; amongst others, to the ventilation of ships, of railway and other tunnels and sewers. Amongst the additional applications is that of extracting bilge and other water from ships, in which not merely currents induced by steam, but by the water blown off the boilers; and also by the inductive action of the current at the ship's bottom, produced when moving through the water.

One form of the steam jet pump or ejector used consists of a conical covered nozzle, injecting steam into a conical passage in front, thereby drawing up with it a current of air through an opening in the side of the casing, and thence into the conical passage in front.

In another form "the waste steam, water, or air to be drawn "off and ejected" enters the pipe leading into the nozzle, the propelling steam through an opening in the side of the casing and thence into the conical passage in front of the nozzle; the relative positions of the active and passive fluids being initially the reverse to those in the former instance.

A transverse section of a tunnel is shown with pipes leading from the upper part and the lower part in a horizontal main in communication with the ventilating chimney, which is provided with one or more ejectors.

Sewers are similarly ventilated, superheated steam being preferably employed "for the purpose of more or less disinfecting "the noxious gases." The passages for the foul gases "may be "formed with rectangular or other openings capable of being "opened and closed at will."

In the case of a steam ship, pipes, provided with ejectors, are placed either beneath or made to pass "through spaces left in the "knees of the deck beams," and thus communicate with the funnel of the steam boilers "in a manner similar to that described "with reference to the tunnel."

[Printed, 1s. 6d. **Drawings.]**

A.D. 1866, August 2.—Nº 1997.

CAMPBELL, George. — (*A communication from Jeremiah William Foard.*)—(*Provisional protection only.*)—"Improvements "in apparatus for raising aeriform and other fluids," "for "ventilating or withdrawing air from rooms, buildings, vessels, "carriages, chimney and other shafts."

An instrument, at one end cylindrical and the other conical, has the smaller end of its conical part corresponding in diameter with and being fixed to the cylindrical part. Through one side of the conical end is a tube corresponding in diameter with the upper end of the outlet shaft. This tube is formed with an elbow bend which enters the cylindrical part and occupies part of its lower capacity. This apparatus is mounted on the upper end of the outlet pipe in such manner that it may turn, and a vane is applied to the instrument so that it can set itself to the wind.

In apparatus for raising water a suction pipe is used, closed at its upper end and conical at its lower end, the larger end of the cone being downwards. "Across this cone and near its bottom "is a horizontal partition having an opening through it, with "a valve opening inwards." Near the top of this pipe is an outlet pipe which inclines downwards, and a blast pipe smaller than the outlet is introduced through the suction pipe "and its "outer end rests within the outlet pipe near where it joins the "suction pipe. Air or steam passed through the blast pipe "causes exhaustion in the suction pipe."

[Printed, 4*d*. No Drawings.]

A.D. 1866, August 7.—Nº 2029.

LYWOOD, Edwin.—Apparatus for ascertaining the temperature of hay, corn, haulm, or seed ricks, stacks, mows, or heaps, also applicable for ventilating them, and for extracting samples from the interior.

A tube of metal or wood, having a number of apertures all along its surface, is closed at one end by means of a conical head, made slightly larger in diameter. This tube is forced into the body of the rick, stack, mow, or heap, either by driving it in by blows or pressure, or by forming a screw thread upon the tube and screwing it in. The tube having been inserted, a thermometer attached to a rod is introduced down the tube, whereby the temperature at that part of the rick will be ascertained. If the temperature of the stack is found to be higher than advisable, the perforated tube is left in it, whereby the hot air or steam from the interior, passing through the apertures into the tube, will escape through the open end, projecting from the rick.

If the tube is in a more or less horizontal position, the passage of the steam and hot air may be accelerated by causing open end to communicate with a vertical tube or flue outside the rick, acting as a chimney, and the draught up such flue may, be still further accelerated by introducing a jet of air or steam into the same.

In order to obtain samples of the hay, corn, or seeds, in the interior of the rick, small projections or cups or recesses are formed near the closed end of the tube, which take up a portion of the substance as the tube is drawn out.

[Printed, 8*d*. Drawing.]

A.D. 1866, August 27.—N° 2206. (* *)

DAVIS, Thomas.—"An improved method of or apparatus for "ventilating dwelling-houses or other buildings." The object of this invention is to ensure a perfect ventilation or change of air in the rooms of dwelling houses or other buildings, railway carriages, ships, and navigating vessels, and in all other structures in which it is needed, without allowing a downward draught, or causing any inconvenient current.

In some cases an aperture is made which is called a "per-"haustor," near the ceiling of the room or place to be ventilated (or if desirable lower down) into the chimney, or into a ventilating shaft suited to the purpose. A tube called a "perflator" has one end entering and passing the ceiling, and to this, when necessary, is attached a tube communicating with the open air. The other end of this tube faces or enters the aperture above named, care being taken to leave sufficient space around such aperture for the foul air of the room to enter and be carried forward along the tube or pipe into the chimney or ventilating shaft. If preferred the perflator may be made to act around the perhaustor, and the perhaustor be placed in the centre. In order to quicken the current when a peculiarly powerful draught is required, a jet or jets of gas or other rarefying agent may be placed within a tube in the chimney breast, or in a contrivance in the chimney or ventilating shaft, or simply within the shaft itself. In some cases an aperture is made in the ceiling, and this aperture is connected by means of a tube with another aperture leading into the chimney or ventilating shaft between the ceiling and floor above, or the ceiling and roof above. Into such tube another tube runs (communicating or not as may be requisite with the open air) and proceeds more or less towards the aperture in the chimney or ventilating shaft, and if desired it may enter it. Or the open air tube need not be employed; in which case an aperture is made in the ceiling to introduce one end of the tube, and thus connect the aperture in the ceiling with the air aperture made in the chimney front over the fire-place. The open end of the tube is brought opposite to the opening into the chimney, care being taken to leave space enough between the two tubes or pipes for the passage of the foul air from the room.

In another class of cases, where there is neither flue nor shaft, or neither is required, "I simply make an aperture in the ceiling " or upper part of a room or building and point towards it, or " make to enter it a tube from the open air, leaving adequate " space around, as above, and I use in addition (where requisite) " gas or other rarefying agent within a tube ascending from the " aperture. In all cases I make ample inlets for air just where " and as they are least inconvenient."

[Printed, 10*d*. Drawing.]

A.D. 1866, September 8.—N° 2307. (* *)

TOSSELL, Michael.—(*Provisional protection not allowed.*)— " Chimney cowl or ventilator." It consists of "a number of " upright venetian bars fixed to a circular tube at one side." At the other end is "a ring to secure the bars at top, also an internal " wind guard directed by a vain." "The ventilator is double in " action with internal tube, the one to direct the cold air down " and the other to allow the heated air to escape, the pure air " being dispersed at any given angle, while it gives a pressure, " obviates a draught; also a funnel to direct the heat air, being " self-acting and complete in itself."

[Printed, 4*d*. No Drawings.]

A.D. 1866, September 21.—N° 2433.

DYSON, George.—"Improvements in drying and ventilating " *corn* and other agricultural produce, and in apparatus " *therefor*."

The crop of corn, or hay, removed from the field soon after being cut, is then built in stacks of a circular form, and of small dimensions. In the centre of each stack is placed perpendicularly a hollow cylinder or cone of galvanized iron, reaching from the base nearly to the crown. The cylinder or cone is pierced over its surface with small holes to admit the passage of air; while its bottom is open and the top closed. The stacks are placed upon raised platforms supported by iron or stone pillars. To the open bottom of the cone connected is a pipe communicating with an air pump, fan, or blowing engine for compressing or exhausting air. The stack of grain being built round the cone, and the connection made with the air pump; the machine is to be put in motion either by manual labour, horse, steam, or water, and air forced or drawn through the stack by compression or exhaustion If compression be used, the air may, before being forced through the stack, be desicated by passing it through heating or drying stoves or pipes. Or a tall chimney may be used for producing exhaustion. The upper part of the stack should be covered to prevent rain falling thereon.

[Printed, 10*d*. Drawing.]

A.D. 1866, September 24.—N° 2448.

WHITAKER, Thomas, and CONSTANTINE, Joseph.—"Im-" provements in the construction of stoves or other heating " apparatus for warming and ventilating public and private " buildings, baths, hothouses, and drying houses."

They relate to a form of stove which may be enclosed in an outer casing, the air heated in the intermediate space being conveyed by pipes to the spaces "which have to be warmed and " ventilated." The stove described is stated to be specially " suitable for heating a church, large hall," or "Turkish bath." It is square, but the improvements are stated to be equally applicable to cylindrical and oval stoves; and the Specification embodies numerous other variations in detail.

Stoves are to be constructed of hollow segments forming the sides, and, with the internal lining, the flues also. These segments are of a **V** or **V**-section, hollow towards the inner side, and cast to the general structural shape of the whole stool. In the inner edges are ribs projecting sideways to form the parts of contact between each two adjoining segments.

The centre of the top part, where the hollows or flues from both sides meet, is formed into a short pipe, which leads the smoke into a box running over the whole length of the stove. This smoke flue, supported by the front and back walls, consists of a loose bottom plate, with raised edges all round, and tubes projecting downwards along its centre, fitting loosely over the outlet pipes of the segments, and an inverted trough with a soot door at the front end, and an opening in the top, with a raised edge to receive the smoke pipe leading to the chimney. This smoke box may also be made open at its back end to lead off the smoke into a flue or direct into the chimney. To make the joints between the outlet pipes of the segments and the tubes in the bottom plate of the smoke box, short tubes of sheet metal are used, encasing both of them, and resting on a rim cast round the lower part of the pipe on the segment; the annular space between the three tubes being filled with sand or clay. To make joints between the segments, taper indentations are cast on the top part close behind the ribs, at the inner edges, forming with the ribs and the corresponding indentations of the adjoining segments dovetail grooves. For the vertical joints at the sides there is cast, a short distance from the inner rib, a second rib, which will retain with the one of the adjoining segment a strip of sheet metal, and into the space left between the latter and the inner rib, cement or clay is rammed. The front and back of the stove are formed of separate pieces, and by passing bolts from the former to the latter, outside the segments, the whole structure is held together. In the front plate are the openings for firing and cleaning. Instead of holding all the segments together by the front and back plate, each segment may be fastened to the two adjoining ones by bolts or pins, or cotters, or hoops. "The segments, front and back plates, are mounted on a foot framing, "formed by three plates bolted together, and having a flange all "round the outside of the top edge, and preparations supporting "the cross bars, and dead plates carrying the grate bars. The "segments and back plate rest with their inner edges only on "the foot frame." Bolted to the front plate of stoves which are built in is a frame reaching through the front wall, and carrying the fire and ash-pit doors. In the fire door is a regulator for the admission of air, and a perforated box at the back of it for its *distribution.* For open stoves this front framing may be dis*pensed with,* and the doors be fixed to the front plate and foot framing. The inside of the stove is lined with slabs of fire-proof substance supported by brackets cast with the segments. Slabs are also laid across the top of the side linings. The hollow parts of the segments and back thus form with this lining a number of flues through which the fire gases pass, and thence through the short pipes in the top of the segments to the smoke box, and from thence to the chimney.

In some cases the inner lining is made of cast or wrought iron. The grate is made narrower than the inner width of the segments. When the stove is not in the room which has to be warmed, it is surrounded with walls a short distance off the sides, and the top is covered over. Openings are left all round in the walls near the bottom to admit fresh air, which, rising up, collects in the space over the stove, whence it is conveyed through pipes to the rooms to be warmed and ventilated. A pan of water may be introduced at the top of the apparatus. These stoves are also sometimes enclosed in an iron casing, with openings for the admission of the fresh, and the emission of the hot, air.

[Printed, 10*d*. Drawing.]

A.D. 1866, October 9.—N° 2598.

FORBES, Hugh.—" Improvements in apparatus for the raising and propelling of water or other fluids, applicable likewise as a " ship propeller, motive power, fan, meter, and for other pur-" poses." The invention relates to a form of rotary pump, consisting of two broad toothed wheels gearing into each other.

It is used for pumping air and forcing it through tubes for ventilating mines and other places, " or through a nozzle as a " bellows or fan would operate for a blast furnace." The toothed wheels are covered with cloth or velvet having the nap outwards; and are driven by gearing outside the casing. The broad wheels are either placed alongside each other or one above the other; the inlet orifice being made in one side of the casing between the wheels and the outlet on the opposite side.

Numerous applications and modifications in detail are mentioned in this lengthy specification, which should be consulted. Besides the applications given in the title, it is also to be used as a fire-engine, as a pump for watering lawns, as a ship's pump, and otherwise as a pump for water.

The teeth of the drums preferably bear on each other at the pitch circles; the teeth take a spiral direction from end to end of each drum except when only a few teeth are used; the two drums may be of different dimensions; a covering of elastic material, such as india-rubber, bladder, skin, strengthened with cloth or silk, inflated with air or gas, or spirit, or water, is applied to each drum; different forms of teeth are specified; the casing is so shaped as to prolong its contact with the tips of the teeth of the rotating toothed drums; the fluid raised by the apparatus may be applied to wheels connected with it, so as to maintain the rotation of the drums; and other minor mechanical arrangements of detail are adopted in order to increase the efficiency of the apparatus especially when used to propel, or to be propelled by, water.

[Printed, 1*s.* 6*d.* Drawings.]

A.D. 1866, November 2.—N° 2841.

WATSON, George.—(*Provisional protection only.*)—" Improve-" ments in reflectors and ventilators in connection with gas and " other lights." They "are suitable for shops and halls."

In one modification there is a pendent gas pipe with a horizontal bottom pipe having a number of burners in it. Above the burners is an oblong rectangular reflector framing carried by the gas pipe, or by chains from the roof, or a bracket over head. The sides of the reflector framing are inclined, so that the bottom is the wider part, and the inner surfaces are formed for reflecting, being of tin plate, either plane or indented, and protected by glass, or silvered plain glass, or silvered or unsilvered prismatic glass, or platinised porcelain. There is a narrow opening centrally in the top of the reflector frame, and at a little distance above a concave cover for collecting the gases and air and leading them to a pipe communicating with the middle of the cover, and continued to the outside of the building.

Or the burners may be arranged in crosses or circles, or in two or more rows, the reflector frame and ventilating cover being correspondingly modified.

[Printed, 4*d.* No Drawings.]

A.D. 1866, November 9.—N° 2915.

KERSHAW, John Thomas.—(*Provisional protection only.*) —"An improved ventilator." Into the chimney of a room or apartment, or shop, or into the chimney of any adjoining apartment is fitted a metal frame of a height of from foursevenths of to somewhat less than the depth of the flue, and of a somewhat less width. The depth of the frame is to be that of the chimney breast into which it is fixed. To the frame is fitted a valve, hinged either to its lower part or to a plate in the bottom of the frame, so that the valve will fall inwards into the chimney. To this valve is fixed a weight or spring so that the valve shall always have a tendency to fall open, and also a wire cord which is caused to pass over a pulley fixed to the top or bottom of the frame and continued down the front of the chimney breast. It is so secured that the valve can either be shut close against the frame or allowed to fall open or be set in any intermediate position. In front of the iron frame is fixed a face plate, so ornamented that sufficient open space is left for the foul air to pass into the chimney. With chimney breasts that have a greater thickness from the front to the flue than usual, a second frame of iron is made capable of working with a telescopic motion within the first frame. To or upon this inner frame is fixed the valve, in such wise that it shall, when closed, coincide with the inside of the chimney breast. The valve, when open, falls into the flue of the chimney.

[Printed, 4*d*. No Drawings.]

A.D. 1866, November 10.—N° 2927.

BONNEVILLE, Henri Adrien. — (*A communication from Paschal Joseph Hognoul.*)—“ An improved apparatus for pumping “ or ventilating.” It consists of a form of rotary pump, stated to be applicable to both water and air.

Within an elliptical box are fitted a pair of parallel rollers, made with large cogs working into each other, and in contact with the inside surface of the box. In rotating they exhaust water or air up a pipe opening into one of the sides of the box, and force it up another pipe on the opposite side.

It is stated to be “specially applicable to mining operations or “ hydraulic works.”

[Printed, 8*d*. Drawing.]

A.D. 1866, November 29.—N° 3139.

HUGHES, Edward.—“ Improvements in machinery or apparatus for exhausting and forcing air and gases and for propelling vessels.” They relate to a form of screw fan “for “ ventilating mines, collieries, or buildings,” and for exhausting or forcing gases or fumes, and to a similar propeller for vessels.

The fan consists of a number of single, double, treble, or quadruple vanes of plates of metal fixed to spiral flanges cast in a central boss keyed to a horizontal shaft, carried on pedestals and driven by power. The screw fan turns in a chamber, open below to a cistern containing water, and air-tight at its ends and upper part. To leave the flow of water free in the cistern and chamber, the pedestals and end stuffing boxes are bolted on each side to a horizontal frame resting on the cistern wall and attached to standards in the bottom of the cistern.

When used for exhausting, one end of the chamber communicates by a pipe with the place whence the air is to be drawn, " or to " the condenser when one is used," and the other end by a pipe communicating with the chimney or furnace.

When used for condensing metallic fumes, a constant supply of water is run into the cistern at the top of one end and out at the bottom of the other.

When used for blowing, one end of the chamber communicates with the atmosphere and the other is provided with a nozzle and regulating valve.

[Printed, 1*s.* 4*d.* Drawings.]

A.D. 1866, December 22.—N° 3373. (* *)

SLOPER, Joseph.—(*Provisional protection only.*)—" Improved " means of and apparatus for obtaining motive power applicable " for driving machinery, and for ventilating mines, buildings, " ships, and and other spaces." " I create or produce a powerful " current or currents of air by the means of one or more shafts " built in the usual way of brick or stone, or tubings of metal or " other material, that in proportion to the height or length of the " shafts, funnels, or tubings so the currents of air are increased, " provided that the inside of the shafts, funnels, or tubings are of " the proper " proportions; " or I propose ascending funnels or " tubes made of any suitable material, and to connect and continue from the lower part thereof, if desirable, a continuous " length of conduits or tubings in a longitudinal position along " the ground, or in any direction found most suitable, so as to " catch the air and create the most powerful current or currents " of air through the tubing and up the ascending shafts or " funnels."

" Having got my moving power I propose to affix or attach at " the upper part or outlets of the funnels or shafts my apparatus " or machinery, which consists chiefly of revolving fans, that is, " fans or vanes attached to a central drum, main shaft, or spindle " axle working on centres horizontally or otherwise; or my apparatus " may be placed within the shaft or funnel or in such a " position as by the current of air passing up or from the shaft " or funnel the current of air will cause the fans to revolve with " great velocity, and thus communicate a rotary motion to the " central main shaft, which motion is transmitted by means of " gearing to the machinery it is intended to actuate."

" I intend at the lower part or entrance of the tubing, where " the mouth or entrance is properly constructed, to fix or attach " another revolving fan of a similar kind as before described (if " necessary) working either horizontally or otherwise, for the " purpose of increasing the current of air through the tubings, " with other contrivances inside the tubings or funnels if necessary " for increasing the power, and also apparatus for regulating " the currents of air, or for the purpose of stopping the machinery " or setting it in motion; and I propose (if necessary) to add " upright or vertical apparatus, with revolving fans attached to a " central drum or shaft, and arranged or fixed in such a position " that the wind shall act freely on the fans, which fans will rotate " and this power may be transmitted by means of toothed wheels " and other gear as an auxiliary power to the other machinery " acted on by the currents passing through the tubing or shafts."

[Printed, 4*d*. No Drawings.]

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Hazard, 25.
Grant, 27.
Guy, 28.
Britten, 36.
Blake, 36.
Knox, 37.
Poole, 44.
Green, 48.
Wilson, 54.

Carriages, ventilating—*cont.*
  Palmer, 66.
  Johnson (*Chilcott and Palmer*), 70.
  Miller, 99.
  Curtis, 112.
  Cooke, 117.
  Moes, 120.
  Wheelhouse and Greenwood, 126.
  Parkes, 159.
  Newton (*Hopgood*), 170.
  Gammon, 184.
  Cooke, 196.
  Minchin, 197.
  Wigzell, 200.
  Woodall, 205.
  Flexen, 212.
  Trachsel and Clayton, 215.
  Brown, 216.
  Hilliar, 218.
  Hilliar, 225.
  Flexen, 236.
  Langton, 253.
  Greer, 254.
  Chidley, 265.
  Clay, 278.
  Haseltine (*Gouge*), 294.
  Campbell (*Foard*), 298.
  Davis, 299.

Cellars, ventilating:
  Siemens, 130.
  Chattwood, 214.
  Boggio, 259.

Centrifugal fans. *See* Fans, propellers, and rotary pumps.

Collieries, ventilating. *See* Mines, ventilating.

Corn stacks, ventilating. *See* Ventilating for storing purposes.

Cesspools, ventilating. *See* Sewers, cesspools, and water-closets, ventilating.

Churches, ventilating. *See also* Buildings and rooms, ventilating;
  Walker, 4.
  Stratton, 14.
  Morgan, 16.
  Fell and Cooke, 75.
  Clare, 115.
  Lawrance, 116.
  Travis and Casartelli, 125.
  De Mondésir, Lehaitre, Jullienne, 286.

Chimneys and flues for ventilating purposes. *See also* Furnaces, stoves, and fireplaces for ventilating purposes; Gas-burners, lamps, and other lights, ventilating by means of; Pipes and air conductors for conducting air for ventilating purposes; Syphon tubes for ventilating; Ventilating by heating the air before its admission; Bricks for ventilating:
  Collins, 6.
  Collins, 7.
  Howden, 9.
  De Chabannes, 10.
  Archbold, 13.
  Douglas, 17.
  Carson, 22.
  Guy, 28.
  Kite, 29.
  Leslie, 29.
  Kite, 33.
  Hale, 34.
  Tuck, 34.
  Wilcock, 34.
  Gilmore, 35.
  Meacock, 35.
  Britten, 36.
  Chowne, 36.
  Blake, 36.
  Gordon, 38.
  Murdock, 39.
  Wilkins, 40.
  Newton, 41.
  Pascal, 42.
  Smith and Phillips, 43.
  Dupré and Le Sueur, 45.
  Roberts, 45.
  Rettie, 46.
  Johnson, 49.
  Perkes, 50.
  Billings, 53.
  Marshall, 56.
  Henham, 59.
  Anderson, 60.
  Rogers, 67.
  Gowans, 69.
  Brunton, 72.
  Hawkins, 73.
  Rogers, 74.
  Higgins, 77.
  Low, 79.
  Suter, 81.
  Muir, 82.
  Miller, 86.
  McKinnell, 87.
  Pratt (*Harrison*), 92.
  Salter, 97.
  Miller, 99.
  Devaux, 106.
  De Jong, 106.

Chimneys and flues, &c.—*cont.*
Goode, 107.
Blackwell, 109.
Boyd, 109.
Boyd, 110.
Billing, 114.
Lawrance, 116.
Cook, 116.
Edwards, 119.
Reading, 122.
Leslie, 123.
Heppell, 124.
Paule, 127.
Gedge (*Lorentz*), 131.
Miller, 134.
Butler, 134.
Muir, 138.
Spence, 139.
Chadwick, 139.
Howarth, 142.
Harrington, 143.
Jordan, 150.
Bedborough, 153.
Booth, 155.
Lancaster, 156.
Brown, 158.
Jones, 159.
Cook, 160.
Dible and Graveley, 161.
Smith, 163.
Newton (*Calhoun*), 165.
Atkinson, 169.
Taylor, 169.
Newton (*Stone*), 173.
Billing, 173.
Reid, 175.
Cooke, 177.
Wood, 178.
Lewingdon, 182.
Stevens (*Desanges*), 184.
Chaussenot, 184.
Smith, 186.
Tebbutt, 186.
Batty, 187.
Penrice, 187.
Illingworth, 188.
Hamer, 190.
Beattie, 191.
Silver and Moore, 194.
Bodmer, 194.
Pennycook, 194.
Walker, 195.
Douglas, 212.
Lewal (*Fondet*), 217.
Dobb, 231.
Holt, 245.
Chantrell and Reymond, 245.
Dyer, 258.
Holt, 259.
Brown, 261.
Myers and Stodart, 277.
Le Patourel, 279.
Hilliar, 282.
Campbell (*Foard*), 298.
Tossell, 300.
Kershaw, 304.

Corn stacks, ventilating. *See* Ventilating for storing purposes :

Diving bells and submarine boats, ventilating :
Wharton, Perkins, and Innes, 1.
Evance, Tyssen, Holland, and Halley, 2.
Hooke, Atkinson, Weale, and Nicholls, 2.
Thompson, Graves, Joell, and Cuthbert, 2.
Stapelton, 2.
Schmidt and Dickenson, 7.
Bauer, 63.
Deschamps and Vilcoq, 94.
Danduran, 95.
Tuck, 96.
Newton, 101.
Askew, Askew, and Myers, 120.
Taylor, 136.
Newton, 150.
Masson, 156.
Clark (*Laurent*), 159.
Bauer, 166.
Pautard (*Rouquayrol*), 174.
Meyer, 233.
Henry (*Rouquayrol*), 246.

Draughts, preventing :
Vallance, 12.
Lister, 64.
Greenwood, 68.
McKinnell, 87.
Mackenzie, 155.
Richardson, 157.
Walker, 195.
Chattwood, 214.
Flexen, 236.
Boyle, 255.
Callard, 260.
Welch, 275.
Myers and Stodart, 277.
Hilliar, 282.

Disinfecting air. *See* Purifying and treating air for use in ventilation.

Drying houses and rooms, ventilating. *See* Ventilating for manufacturing purposes.

Factories ; ventilating. *See* Ventilating for manufacturing purposes.

Fans, propellers, and rotary pumps :
White, 5.
Deacon, 9.

Fans, &c.—*cont.*
  Biram, 23.
  Hazard, 25.
  Grant, 27.
  Poole, 30.
  Haig, 30.
  Barsham, 62.
  Biram, 63.
  Kirkwood, 65.
  Henderson, 80.
  Cooper, Heaton, and Langshaw, 117.
  Moes, 120.
  Wheelhouse and Greenwood, 126.
  D'Argy, 140.
  Brun (*Maniguet*), 142.
  Scriven, 145.
  Newton (*Paritz*), 183.
  Hewett, 188.
  Arundell (*Neuerburg*), 199.
  Guibal, 204.
  Ridley and Jones, 209.
  Stevens, 219.
  Norman, 228.
  Bainbridge, 230.
  Stevens, 231.
  Hughes, 238.
  Newton (*Nobles*), 239.
  Welch, 242.
  Johnson (*Harris*), 255.
  Laidlaw and Robertson, 261.
  Leak, 274.
  Johnson (*Haupt*), 274.
  Clay, 278.
  Laroche, 281.
  Forbes, 303.
  Bonneville (*Hognoul*), 305.
  Hughes, 305.
  Sloper, 306.

Flour mills, ventilating. *See* ventilating for manufacturing purposes.

Furnaces, stoves, and fire-places for ventilating purposes :
  Walker, 4.
  Raley, 5.
  Merriman, 6.
  Murray and Anderson, 8.
  Howden, 9.
  Wilcox, 11.
  Sylvester, 14.
  Garsed and Robinson, 15.
  Fourness, 18.
  Jeakes, 21.
  Phillips and Hickinbotham, 23.
  Haden, 24.
  Britten 36.
  Gordon, 38.
  Welch, 48.
  Perkes, 50.
  Hicks, 103.

Furnaces, &c.—*cont.*
  Longbottom, 104.
  Chambor, 105.
  Wadsworth, 108.
  Swain, 116.
  Johnson (*Leasure*), 122.
  Reading, 122.
  Paule, 127.
    (Domestic fire-places) ;
      Miller, 134.
  Stanford, 147.
  Waller, 149.
  Zimara, 206.
  Crestadoro, 209.
  Walton and Moore, 210.
  Chattwood, 214.
  Rosser and Jennings, 225.
  Meyer, 233.
  Simester and Bainbridge, 243.
  Waller, 247.
  Richard, 248.
  Kissack, 263.
  Grundy, 263.
  Welch, 275.
  Urquhart, 294.
  Whitaker and Constantine, 301.

Gas-burners, lamps, and other lights, ventilating by means of :
  De Chabannes, 11,
  Archbold, 13.
  Bernhardt, 17.
  Douglas, 17.
  Haddan and Johnston, 19.
  Joyce, 21.
  Mechi, 23.
  Faraday, 25.
  Murray, 27.
  Grant, 27.
  Kite, 29.
  Poole, 30.
  Braithwaite, 34.
  Blake, 36.
  Defries and Pettit, 37.
  Carter, 40.
  Henderson, 44.
  Brown, 50.
  Sheringham, 52.
  Hall, 64.
  Alldritt, 75.
  Jeakes, 78.
  Simons, 93.
  Goode, 107.
  Bradford, 110.
  Curtis, 112.
  Tillam, 138.
  Hine, 140.
  Nibbs, 151.
  MacKenzie, 151.
  Mackenzie, 155.
  Ferrabee and Ferrabee, 174.
  Bodmer, 194.
  Trachsel and Clayton, 215.
  Brown, 216.

Gas-burners, &c.—*cont.*
  Hill, 232.
  Cutler, 240.
  Wakefield, 245.
  Defries, 260.
  Sang, 263.
  Harrison and Harrison, 287.
  Haseltine (*Gouge*), 294.
  Davis, 299.
  Watson, 304.

Greenhouses, hothouses, and other horticultural buildings, ventilating them:
  Stewart, 6.
  Stratton, 11.
  Wilcox, 11.
  Stratton, 14.
  Webster, 113.
  Wilkins, 135.
  Taylor and Grimshaw, 153.
   (Flower vases);
    Wilkins, 157.
  Shaw, 164.
  Cranston, 193.
  Messenger, 193.
  Wason, 241.
  Beard, 267.
  Dennis, 284.
  Dennis, 295.
  Whitaker and Constantine, 301.

Granaries, ventilating. *See* Ventilating for storing purposes.

Hay ricks, ventilating. *See* Ventilating for storing purposes.

Heating or cooling air for use in ventilation. *See* Ventilation, *thermal*.

Houses, ventilating. *See* Buildings and rooms, ventilating.

Indexes. *See* Air pressure gauges and indexes.

Kilns and drying rooms. *See* Ventilating for manufacturing purposes.

Kitchens, ventilating. *See* Buildings and rooms, ventilating.

Louvre, louver, loover, or luffer-boards. *See* Valves louvres, plates, blinds, or screens, for ventilating purposes; Self-acting valves for determining and regulating the inlet and exit of air.

Marquees, ventilating. *See* Tents, ventilating.

Malt-kilns, ventilating. *See* Ventilating for manufacturing purposes.

Mines, ventilating:
  Sutton, 3.
  Raley, 5.
  Howden, 9.
  De Chabannes, 11.
  Wood, 14.
  Douglas, 17.
  Fourness, 18.
  Buckingham, 18.
  Ruthven and Ruthven, 22.
  Biram, 23.
  Booth, 25.
  Murray, 27.
  Grant, 27.
  Struvé, 32.
  Wilcock, 34.
  Chowne, 36.
  Gordon, 38.
  Crossby, 48.
  Perkes, 50.
  Jones, 61.
  Biram, 63.
  Bakewell, 64.
  Rogers, 67.
  Marlor, 69.
  Peace, 72.
  Lemielle, 73.
  Rogers, 74.
  Higgins, 77.
  Low, 79.
  Delabarre, 83.
  Coulson, 92.
  Bakewell, 99.
  Wadsworth, 100.
  Heaton, 100.
  Longbottom, 4.
  Forster, 105.
  Wadsworth, 108.
  Boycott, 110.
  Heppell, 111.
  Piaud, 118.
  Heppell, 124.
  Travis and Casartelli, 125.
  Paule, 127.
  Heaton, 127.
  Rennie, 128.
  Delmas, 129.
  Imhof, 133.

Mines, ventilating.—*cont.*
Brooman (*Trautmann*), 133.
(Exploding the inflammable gases);
Addison, 136.
Keightley, 136.
Rennie, 137.
Higgins, 144.
Vasserot (*Welter and Bohringer*), 151.
Lancaster, 156.
Wilson, 157.
Newton (*Stone*), 173.
Pautard (*Rouquayrol*), 174.
Hughes, 178.
Colwell, 178.
Williams, 179.
Hewett, 188.
Rydill, 190.
Nixon, 198.
Arundell (*Neuerburg*), 199.
Guibal, 204.
Rydill, 208.
Giachosa, 208.
Crestadoro, 209.
Ridley and Jones, 209.
Wilson, 219.
Lever, 222.
Dobb, 231.
Wilson, 235.
Hughes, 238.
Philipson and Dees, 238.
Newton (*Nobles*), 239.
Welch, 242.
Lever, 245.
Lang, 247.
Rogers, 254.
Johnson (*Harris*), 255.
Alison and Shaw, 257.
Brooks (*Hancock*), 264.
Edwards, 264.
Johnson (*Haupt*), 274.
De Mondésir, Lehaitre, and Jullienne, 286.
Harrison and Harrison, 287.
Parker, 291.
Forbes, 303.
Bonneville (*Hognoul*), 305.
Sloper, 306.

Moistening air for use in ventilation:
Grent, 1.
Murdock, 39.
Johnson (*Chilcott and Palmer*), 70.
Cunningham and Ashley, 74.
Newton (*Hopgood*), 170.
Jackson, 172.
Courtillier, 209.
Newton (*Nobles*), 239.

Omnibuses, ventilating. See *Carriages*, ventilating.

Pipes and air conductors for conducting air for ventilating purposes:
Dible, 51.
Pope, 52.
Jones, 57.
Campin (*Owerduyn and Droinet*), 58.
Fell and Cooke, 75.
Atkinson and Ridge, 97.
Church and Hamlyn, 108.
Jones, 119.
Jennings, 134.
Wilkins, 157.
Aldin, 170.
Macfarlane, 172.
Roberts, 175.
Taylor, 182.
Tebbutt, 186.
Noualhier, 204.
Shanks, 206.
Walton and Moore, 210.
Sinclair, 211.
Kitchin, 211.
Burridge, 216.
Mortimer, 229.
Lever, 245.
Deane, 279.
Deane, 289.
Lywood, 298.

Purifying and treating air for use in ventilation:
Stapelton, 2.
De Chabannes, 10.
Vigers, 24.
Payerne, 26.
Cunningham and Ashley, 74.
Stephens, 76.
Anderson, 81.
Howard, 132.
Higgins, 144.
Mennons, 144.
Spencer, 146.
Harrison, 149.
Newton, 150.
White, 154.
Jackson, 172.
Pautard (*Rouquayrol*), 174.
Hughes, 178.
Rimmel, 183.
Courtillier, 209.
Trachsel and Clayton, 215.
Clay, 278.
Harrison and Harrison, 287.
Clark (*Lyman*), 288.

Prisons, ventilating. *See* Buildings and rooms, ventilating.

Punkas and fanners:
Cook, 85.
(Driving them);
Remfrey, 121.

Punkas and fanners—*cont.*
    (Driven by clockwork);
      Kent, 161.
    (Ladies' fans);
      Sonnhammer, 232.
  Marsh, 282.
  Bennett, 290.

Railway carriages, ventilating. *See* Carriages, ventilating:

Regulating the inlet and exit of air. *See* Self-acting valves for determining and regulating the inlet and exit of air; Valves, louvres, plates, blinds, or screens, for ventilating purposes.

Rooms, ventilating. *See* Buildings and rooms, ventilating.

Self-acting valves for determining and regulating the inlet and exit of air:—*See also* Valves, louvres, plates, blinds, or screens, for ventilating purposes.
  Ward, 16.
  Wroughton, 33.
  Braithwaite, 34.
  Ward, 55.
  Kraut, 67.
  Fast, 72.
  Trimble ,76.
  Heaton, 100.
  Webster, 113.
  Heywood, 124.
  Travis and Casartelli, 125.
  Keightley, 136.
  Taylor and Grimshaw, 153.
  Hawksley, 197.
  Willis, 206.

Sewers, cesspools, and water-closets, ventilating:
  De la Chaumette, 3.
  McFarlane, 50.
  Weight, 60.
  Rogers, 67.
  Anderson, 81.
  Marsden, 98.
  Treeby, 114.
  Clare, 115.
  Robinson, 146.
  Jennings and Lovegrove, 147.
  Burrell, 148.
  Stevens (*Desanges*), 184.
  Lemaistre, 210.
  Steven and Batty, 250.

Sewers, &c.—*cont.*
  De Mondésir, Lehaitre, and Jullienne, 286.
  Harrison and Harrison, 287.
  Aydon and Field, 297.

Shafts for ventilation. *See* Pipes and air conductors for conducting air for ventilating purposes. *See also* Mines, ventilating:

Ships, ventilating:
  Sutton, 3.
  Howden, 9.
  De Chabannes, 10.
  Garsed and Robinson, 15.
  Buckingham, 18.
  Ruthven and Ruthven, 22.
  Grant, 27.
  Guy, 28.
  Gilmore, 35.
  Meacock, 35.
  Blake, 36.
  Murdock, 39.
  Roberts, 45.
  Crossby, 48.
  Watson, 51.
  Dible, 51.
  Pope, 52.
  Campin (*Overduyn and Droinet*), 58.
  Anderson, 60.
  Weight, 60.
  Hall, 64.
  Tronson, 65.
  Cunningham and Ashley, 74.
  Burns, 76.
  Higgins, 77.
  Henderson, 80.
  Delabarre, 83.
  Bakewell, 99.
  Williams, 102.
  Fontainemoreau, 104.
  Hubert, 106.
  Young, 112.
  Powers, 123.
  Ogle, 125.
  Delmas, 129.
  Harrington, 143.
  Winans and Winans, 144.
  Robinson, 146.
  Wainwright, 150.
  Jordan, 150.
  Nibbs, 151.
  Booth, 155.
  Galloway, 157.
  Dible and Graveley, 161.
  Newton (*Stone*), 173.
  Reid, 175.
  Simons, 185.
  Prosser, 185.
  Clark (*Scholl*), 186.
  Silver and Moore, 194.
  Wigzell, 209.

Ships, ventilating.—*cont.*

Clark (*De Lapparent*), 200.
Dunn, 201.
Woodbury, 204.
Moore, 207.
Giachosa, 208.
Crestadoro, 209.
Robinson, 213.
Kopisch, 216.
Brown, 216.
Edmonds, 220.
Parker (*Partridge*), 224.
Mulhollond, 234.
Flexen, 236.
Newton (*Nobles*), 239.
Welch, 242.
McLaine, 248.
Steven and Batty, 250.
Walker, 251.
Langton, 253.
Walker, 258.
Boggio, 259.
Brown, 261.
Brookes (*Hancock*), 264.
Jeffreys, 266.
Lungley, 268.
Haseltine (*Walker*), 268.
Edmonds, 276.
Deane, 279.
Le Patourel, 279.
Woodward, 283.
Huntly, 285.
De Mondésir, Lehaitre, and Jullienne, 286.
Harrison and Harrison, 287.
Deane, 289.
Haseltine (*Gouge*), 294.
Aydon and Field, 297.
Campbell (*Foard*), 298.
Davis, 299.
Sloper, 306.

Shops, ventilating. *See* Buildings and rooms, ventilating.

Stables, ventilating. *See also* Buildings and rooms, ventilating.

Looker, 85.
De Menonville, 188.

Steam and air jets for ventilating purposes:

Carson, 22.
Grant, 27.
Roberts, 45.
Delabarre, 83.
Tillam, 138.
Harrington, 143.
  (Currents of air);
    Anderson, 145.
Sievier, 162.
Newton (*Calhoun*), 165.

Steam and air jets, &c.—*cont.*

Newton (*Stone*), 173.
Wilson, 219.
Evans and Griffiths, 222.
Wilson, 235.
Laidlaw and Robertson, 261.
Brookes (*Hancock*), 264.
Edmonds, 276.
De Mondésir, Lehaitre, and Jullienne, 286.
Parker, 291.
Aydon and Field, 297.

Stoves. *See* Furnaces, stoves, and fire-places for ventilating purposes.

Syphon tubes for ventilating:

  (For ships);
    Guy, 28.
Chowne, 36.
Howell, 53.
Danduran, 95.
Salter, 97.

Tents, ventilating:

Collins, 6.
Maberly, 8.
Lambert, 49.
Doyle, 65.
Marsden, 86.
Turner, 89.
Christie, 90.
Powell, 103.
Green, 107.
  (Photographic tents):
    Jeffery, 159.

Tunnels, ventilating:

Treeby, 114.
  (While being cut):
    Penrice, 187.
Rydill, 190.
  (While being cut);
    Johnson (*Haupt*), 274.
De Mondésir, Lehaitre, and Jullienne, 286.
Aydon and Field, 297.

Treating air for use in ventilation purposes. *See* Ventilating by cooling the air before its admission; Ventilating by heating the air before its admission; Moistening air for use in ventilation; Purifying air for use in ventilation.

Valves, louvres, plates, blinds, or screens for ventilating purposes. *See also* Self-acting valves for determining and regulating the inlet and exit of air.
Black, 4.
Collins, 7.
Stratton, 14.
Baillie, 18.
Berington and Richards, 19.
Guy, 28.
Baillie, 29.
Leslie, 29.
Marvin and Moore, 33.
Wroughton, 33.
Lochhead, 35.
Meacock, 35.
Knox, 37.
Wilkins, 40.
Wilson, 40.
Pascal, 42.
Cogan, 43.
Mellish, 44.
Rettie, 46.
Lambert, 49.
Robinson, 50.
McFarlane, 50.
Watson, 51.
Wilson, 54.
Anderson, 55.
Christian, 59.
Hall, 64.
Restell, 66.
Palmer, 66.
Johnson (*Chilcott and Palmer*), 70.
Fast, 72.
Fell and Cooke, 75.
Adams, 75.
Wigginton, 78.
Bennett, 85.
Looker, 85.
Marsden, 86.
McKinnell, 87.
Bartlett, 87.
Corbitt, 88.
Turner, 89.
Henson, 90.
Clarke, 98.
Williams, 102.
Devaux, 104.
De Jong, 106.
Young, 112.
Cooke, 117.
Cooke, 118.
Edwards, 119.
Powers, 123.
Heywood, 124.
Engledue and Cullis, 125.
Travis and Casartelli, 125.
Rankin, 126.
Bertwistle and Bertwistle, 131.
Miller, 134.
Parker, 135.

Valves, &c.—*cont.*
Wilkins, 135.
Jennings and Lovegrove, 147.
Wainwright, 150.
Jordan, 150.
Mackenzie, 155.
Booth, 155.
Wilson, 157.
Noualhier, 158.
Parkes, 159.
Davies, 161.
Wemyss, 163.
Stather, 163.
Shaw, 164.
Anderson, 164.
Morrell, 165.
Taylor, 169.
Cooke, 177.
Cooke, 180.
Fuller, Jaques, and Fanshawe, 180.
Gammon, 184.
Clark (*Scholl*), 186.
Batty, 187.
De Menonville, 188.
Brown, 189.
Wenton, 189.
Wilds, 192.
Robb, 192.
Cranston, 193.
Wainwright, 195.
Cooke, 196.
Hawksley, 197.
Minchin, 197.
Whibley and Lumley, 198.
McHaffie, 199.
Willis, 206.
Cooke, 214.
Hilliar, 217.
Hilliar, 218.
Hilliar, 225.
Boyle, 227.
Flexen, 236.
Wintour, 237.
Boyle, 242.
Waller, 247.
Greer, 254.
Boyle, 255.
Callard, 260.
(Blinds);
King, 273.
Billings, 282.
Cooke, 283.
White, 285.
White, 293.
Kershaw, 304.

Ventilating. *See*—
Air baths; Buildings and rooms; Carriages; Churches; Diving-bells and submarine boats; Green-houses, hot-houses, and other

Ventilating—*cont.*
horticultural buildings; Mines; Prisons; Sewers, cesspools, and water-closets; Ships; Tents; and Tunnels.

Ventilating by the action of wind:
Carson, 22.
Kite, 29.
Kite, 33.
Gilmore, 35.
Pascal, 42.
Poole, 44.
Brunton, 72.
Hawkins, 73.
Higgins, 77.
Suter, 81.
Muir, 82.
Miller, 86.
Henson. 90.
Miller, 99.
Cook, 116.
Delmas, 129.
Spence, 139.
Chadwick, 139.
Chadwick, 141.
Noualhier, 158.
Atkinson, 169.
Lewingdon, 182.
Stevens (*Desanges*), 184.
Smith, 186.
Pennycook, 194.
Wigzell, 200.
Moore, 207.
Haseltine (*Robbins*), 212.
Robinson, 213.
Fellows, 235.
Brown, 261.
Huntly, 285.
Campbell (*Foard*), 298.
Watson, 304.

Ventilating by cooling the air before its admission:
Vallance, 12.
Newton, 41.
Nesmond, 54.
Vion, 56.
Newton, 98.
Moes, 120.
Colladon, 123.
Siemens, 130.
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- Steam and air jets for ventilating purposes;
- Water-jets and water currents for ventilating.

Ventilation, *natural*, or by spontaneous action. *See*—
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  Valves, louvres, plates, blinds, or screens for ventilating purposes;
  Ventilation by the action of the wind.

Ventilation, *thermal*, or ventilation by means of the currents caused by a column of air, heated or cooled artificially or otherwise. *See*—
  Chimneys and flues for ventilating purposes;
  Furnaces, stoves, and fireplaces for ventilating purposes;
  Gas burners, lamps, and other lights, ventilating by means of;
  Syphon tubes for ventilating;
  Ventilating by cooling the air before its admission;
  Ventilating by heating the air before its admission.
 See also—
  Moistening air for use in ventilation;
  Purifying and treating air for use in ventilation.

Ventilators. *See*—
  Self-acting valves for determining and regulating the inlet and exit of air;
  Valves, louvres, plates, blinds, or screens for ventilating purposes;
  Chimneys and flues for ventilating purposes;
  [As, with Specifications of a continental origin, the French word "*ventilateur*," and the German word "*Ventilator*" for fan, is sometimes incorrectly translated by the English word, "ventilator"] *See also*—
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5. SUPPLEMENT to the SERIES of LETTERS PATENT and SPECIFICATIONS, from A.D. 1617 to Oct. 1852; consisting for the most part of Reprints of scarce Pamphlets, descriptive of the early patented Inventions comprised in that Series.

CONTENTS.

1. Metallica; or the Treatise of Metallica, briefly comprehending the doctrine of diverse new metallical inventions, &c. By Simon Sturtevant. (*Letters Patent, dated 29th February* 1611.) Price 1*s*. 4*d*.; by post, 1*s*. 5*d*.
2. A Treatise of Metallica, but not that which was published by Mr. Simon Sturtevant, upon his Patent, &c. By John Rovenzon. (*Letters Patent granted A.D.* 1612.) Price 4*d*; by post, 4½*d*.
3. A Commission directed to Sir Richard Wynne and others to inquire upon oath whether Nicholas Page or Sir Nicholas Halse was the first inventor of certaine kilnes for the drying of malt, &c. &c. (*Letters Patent, Nos.* 33 *and* 85, *respectively dated 8th April* 1626, *and 23rd July* 1635.) Price 2*d*.; by post, 2½*d*.
4. Dud Dudley's Metallum Martis; or iron made with pit-coale, sea-coale, &c. (*Letters Patent, Nos.* 18 *and* 117, *respectively dated 22nd February* 1620, *and 2nd May* 1638.) Price 8*d*.; by post, 9*d*.
5. Description of the nature and working of the Patent Waterscoop Wheels invented by William Wheler, as compared with the raising wheels now in common use. By J. W. B. Translated from the Dutch by Dr. Tolhausen. (*Letters Patent, No.* 127, *dated 24th June* 1642.) Price 2*s*.; by post, 2*s*. 1½*d*.
6. An exact and true definition of the stupendous Water-commanding Engine invented by the Right Honourable (and deservedly to be praised and admired) Edward Somerset, Lord Marquis of Worcester, &c. &c. (*Stat.* 15 *Car. II. c.* 12. *A.D.* 1663.) Price 4*d*.; by post, 4½*d*.
7. Navigation improved; or the art of rowing ships of all rates in calms with a more easy, swift, and steady motion than oars can. By Thomas Savery. (*Letters Patent, No.* 347, *dated 10th January* 1696.) Price 1*s*.; by post, 1*s*. ½*d*.
8. The Miner's Friend; or an engine to raise water by fire, described, &c By Thomas Savery. (*Letters Patent, No.* 356, *dated 25th July* 1698, *and Stat.* 10 *&* 11 *Will. III. c.* 31, *A.D.* 1699.) Price 1*s*.; by post, 1*s*. 1*d*.
9. Specimina Ichnographica; or a brief narrative of several new inventions and experiments, particularly the navigating a ship in a calm, &c. By John Allen, M.D. (*Letters Patent, No.* 513, *dated 7th August* 1729.) Price 8*d*.; *by post*, 8½*d*.

10. A description and draught of a new-invented Macnine for carrying vessels or ships out of or into any harbour, port, or river against wind and tide, or in a calm, &c. By JONATHAN HULLS. (*Letters Patent, No.* 556, *dated* 21*st December* 1736.) Price 8*d.*; by post, 9*d.*

11. An historical account of a new method for extracting the foul air out of ships, &c., with the description and draught of the machines by which it is performed, &c. By SAMUEL SUTTON, the Inventor. To which are annexed two relations given thereof to the Royal Society by Dr. Mead and Mr. Watson. (*Letters Patent, No.* 602, *dated* 16*th March* 1744.) Price 1*s.*; by post, 1*s.* 1*d.*

12. The letter of Master WILLIAM DRUMMOND for the construction of machines, weapons, and engines of war for attack or defence by land or sea, &c, Dated the 29th Septemper 1626. (*Scotch Patent, temp. Car. II.*) Price 4*d.*

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The Abridgments delivered at the Patent Office by the Applicants for Letters Patent will in future be published weekly (commencing on Friday, July 14), with Indexes of Persons and Subjects. In the body of the work the Abridgments of the Provisional and Complete Specifications will be published in regular numerical order at the expiration of the term of six months from the date of application. But each weekly number will have an appendix, containing the Abridgments open to public inspection before the expiration of the term of six months, in consequence of the Patentees having filed their Final Specifications, and also the Abridgments of Complete Specifications just received. These Abridgments will be subsequently printed in the body of the work in their proper places, in order to preserve the numerical and chronological arrangement of the book. In the indexes of each successive number all the previous indexes will be incorporated until the end of the year; and then the last indexes only should be retained to bind with the fifty-two weekly parts in one volume for the year.

B. WOODCROFT.

July 10, 1871.

⁂ The work referred to in the above notice is published (under the title of "Chronological and Descriptive Index of Patents," &c.) on Friday in each week, and is forwarded, post free, to subscribers. Terms 22*s.* per annum. Subscriptions received at the Sale Room of the Patent Office, 25, Southampton Buildings, Holborn, where also single copies, at 4*d.* each, may be obtained. Post Office Orders to be made payable at the Post Office, Holborn to Mr. Bennet Woodcroft, Clerk to the Commissioners of Patents.